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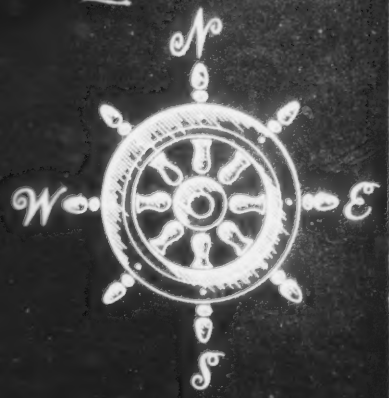
# SOIL SURVEY OF CAPE BRETON ISLAND NOVA SCOTIA



# SOIL SURVEY OF CAPE BRETON ISLAND NOVA SCOTIA

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and

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and Marketing

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## PREFACE

Because of the public demand for information on the soils of Cape Breton Island, Nova Scotia, this soil survey report has been reprinted. During the years since the report was published, substantial changes have taken place in survey techniques, in the system of soil classification, and in soil evaluations. The latest edition of *The Canadian System of Soil Classification* is available from authorized bookstore agents, other local bookstores, or by mail for $9.00 ($10.80 outside Canada) from the Canadian Government Publishing Centre, Supply and Services Canada, Hull, Que. K1A 0S9. Your cheque or money order in Canadian funds should be made payable to the Receiver General for Canada.

The maps were recompiled on a new topographic base, which has created slight discrepancies along streams and other water features. It is necessary to regard with caution the delineation of adjacent soils, such as stream floodplains.

A generalized soil map of the province was published in 1974 under the title: *Soils of Nova Scotia*. A map depicting the suitability of Nova Scotia soils for septic tanks is also available. Address your requests to: Soils and Crops Branch, Nova Scotia Department of Agriculture and Marketing, Nova Scotia Agricultural College, Truro, N.S.

## ACKNOWLEDGMENTS

The soil survey of Cape Breton Island was a joint project of the Canada Department of Agriculture and the Nova Scotia Department of Agriculture and Marketing. The field work was directed by Dr. D. B. Cann, and the authors were assisted in the field by G. T. Cummings and J. E. Hawley.

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The soil map was prepared by the Cartography Section, Soil Research Institute, Ottawa. The Nova Scotia Agricultural College, Truro, provided headquarters and laboratory facilities for the work.

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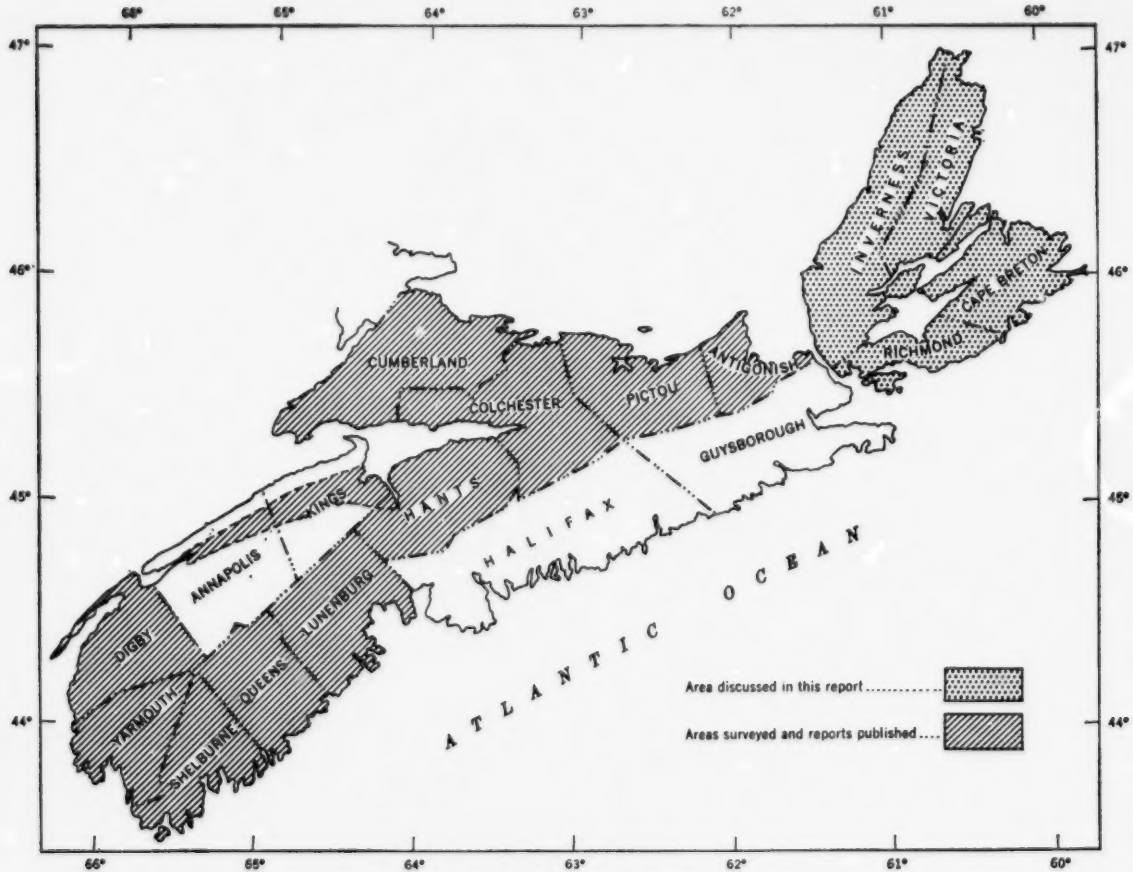


FIGURE 1. Areas of Nova Scotia in which the soils have been surveyed.

## INTRODUCTION

This report deals with the soils of Cape Breton Island, which comprises the counties of Inverness, Cape Breton, Richmond and Victoria.

The main part of the report describes the soils in detail and their suitability for agriculture. The relationship of climate, vegetation, topography, and geology of the area are discussed briefly. In addition, the soils are rated for their adaptability to certain crops commonly grown in the area.

A soil map, accompanying the report, shows the locations of towns, rivers, lakes, roads and railroads, as well as the distributions of the various soils. The soil series, and their topography and stoniness, are shown by colors and symbols which are described in the map legend.

Anyone interested in a particular piece of land should first locate it on the soil map and refer to the appropriate color and symbol in the legend, where a brief description of the soil is found. More information on the particular soil can be obtained from the report.

The report and map, although compiled mainly for agricultural purposes, contain information useful to those interested in land use, highway construction, forestry, wildlife, conservation, and recreational facilities.

## GENERAL DESCRIPTION OF THE AREA

### Location and Extent

Cape Breton Island (Figure 1) is separated from the mainland of Nova Scotia by the Strait of Canso, which is about one mile wide at its narrowest part. A causeway connects the mainland with the Island and provides access for rail and road traffic. The Strait of Canso joins George Bay on the north with Chedabucto Bay on the south, and these waters form boundaries on the southwest and south parts of the Island. The west and north coasts border on the Gulf of St. Lawrence and Cabot Strait, and the east coast is on the Atlantic Ocean.

The area lies between 47°10′ and 45°25′ north latitude and 61°25′ and 59°45′ west longitude and occupies 4,123 square miles, or 2,638,883 acres.

### History and Development

Before Cape Breton Island was settled by Europeans, it was an important base for the French, British and Spanish fishing fleets that crossed the Atlantic each year and used harbors along the coast as places to dry and salt their catch. The first known settlement was established at Baleine on the east coast in 1629. In the next 80 years, two other settlements, at St. Ann's and River Denys, were established. In 1632 Cape Breton was ceded to France by the treaty of St. Germain. Soon after, the Treaty of Utrecht, in 1713, deprived the French of the mainland of Nova Scotia. They established a capital and a fortress at Louisburg. The fortress was captured by the British in 1745, but restored to the French in 1748 and finally recaptured by the British in 1758. The Island was united with Nova Scotia under British rule in 1763, but was separated again in 1784, when a new capital, Sydney, was built at the mouth of Sydney River. The Island was reunited with Nova Scotia in 1820.

The first settlement on the west coast was established at Cheticamp in 1786. Other small villages that soon were established along the coast were settled mainly by French people, and the rest of the Island chiefly by Irish and Scottish immigrants.

The economy of the Island has depended largely on the huge deposits of bituminous coal that underlie the area in various places. Coal mining is associated with a steel industry as a major source of employment in the Sydney–Glace Bay area. Agricultural development has been stimulated by the growth of the industrialized area, which provides the main market for agricultural products.

## Population, Towns and Industries

The total population of the Island has increased gradually from 75,483 in 1871 to 169,865 in 1961 (Figure 2). Since about 1891, however, the population has decreased slightly in all counties except Cape Breton, where increases have followed development of the coal and steel industries. In 1961 the rural population was about 34 per cent of the total and nearly one third of these lived in Inverness County. At this time Cape Breton County had more than 77 per cent of the total population.

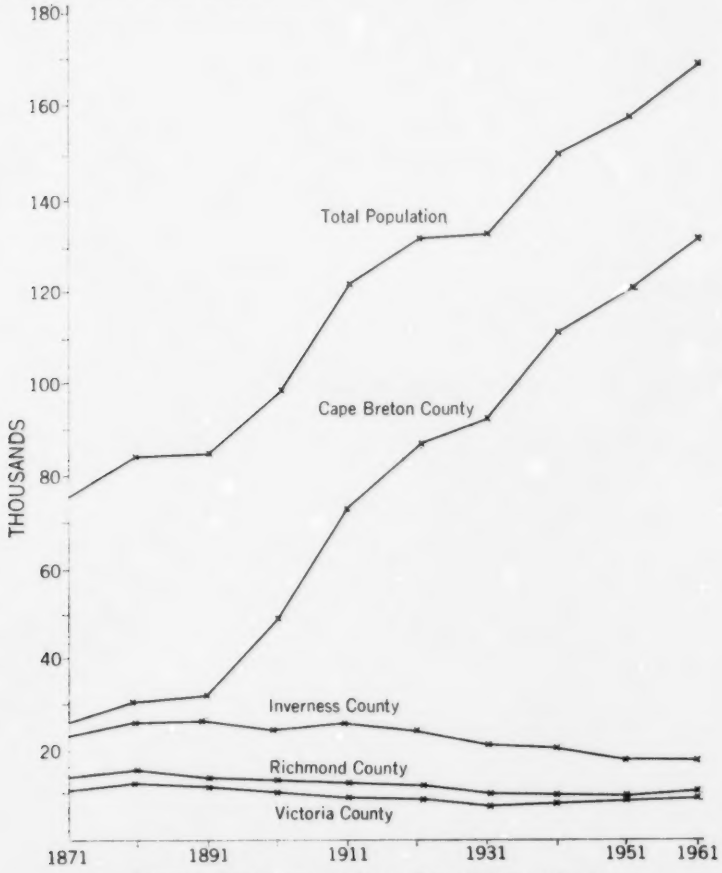


FIGURE 2. Population trends in Cape Breton, 1871-1961.

Cape Breton County has most of the towns and the only city on the Island. Sydney, with a population of 33,617, is the hub of industrial Cape Breton. Glace Bay is next in size with a population of 24,186 and is one of

the largest incorporated towns in Canada. New Waterford (10,592), North Sydney (8,657), Sydney Mines (9,122) and Louisburg (1,417) are other incorporated towns. Reserve Mines, a village, has a population of about 3,000. Among the smaller villages and communities are Port Morien, Boisdale, Victoria Mines, Mira, Gabarus, Westmount and Florence.

Many of the larger towns and villages in Cape Breton County have developed in coal mining areas. However, Louisburg, Mira and Gabarus depend almost entirely on fishing and fish processing. The economies of Sydney and a number of nearby towns are closely tied to the coal and steel industries; wood products and millwork are secondary industries. Much of the production of the Sydney area is in the form of products such as structural steel, boilers, tanks, coal tar, creosote, pig iron, steel billets, rails, bars, wire rods and nails. In recent years, the economy of this area has suffered seriously from competition with fuel oil as a source of heat and power for homes and railroads.

Inverness County has only two towns. Inverness, with a population of 2,109, is the county seat. Port Hawkesbury has a population of 1,346 but is likely to grow because a pulp mill was recently established nearby. Coal mining played an important part in the development of the Port Hood–Inverness–Mabou area, but coal production in this area has dwindled to almost nothing. From north to south on the west coast of Inverness County are such villages and communities as Cheticamp, Margaree Harbor, Margaree Forks, Mabou, Port Hood and Port Hastings. Inland are Northeast Margaree and Whycocomagh, with numerous hamlets scattered throughout the valleys and coastal areas of the County. With few secondary industries of importance, the economy of Inverness County is largely based on agriculture, forestry and fishing. The tourist industry is important since large numbers of visitors are attracted by the scenic drive around the Cabot Trail.

Victoria County has no towns and only one village, Baddeck. This is the county seat and has a population of about 700. Other communities in the area are Middle River, St. Ann's, Ingonish, Cape North and Dingwall. Though short on industry and agricultural land, the County abounds in scenic areas and attracts many tourists. Production of gypsum at Dingwall supported the economy of that area for years, but the mine was closed in 1956. The economy of the County now depends mainly on forestry and fishing.

Richmond County has two main centers of population: St. Peters with about 800 residents and Arichat with about 700. Smaller villages in the County include Petit-de-Grat Bridge, West Arichat, D'Escousse, River Bourgeois, Louisdale, Grand Anse, Soldier Cove, Grand River and L'Ardoise. About 60 per cent of the population is of French origin. The principal industries in the County are fishing, forestry, farming, and fish processing. Most of the County is forested and produces a large cordage of pulpwood annually. Much of the pulpwood is loaded in ships on Bras d'Or Lake and is taken to a paper mill at Liverpool, Queens County, for processing.

## Transportation and Markets

The Canadian National Railways has one main line and two branch lines in Cape Breton (Figure 3). The main line crosses the causeway at Port Hastings and runs from Port Hawkesbury to Sydney, passing through West Bay Road, River Denys, Orangedale, McKinnons Harbor, Boisdale, North Sydney and Sydney Mines. A branch line to St. Peters passes through Grand Anse; another serves the area from Hawkesbury to Inverness on the west coast, passing through Long Point, Judique, Port Hood, Mabou and Strathlorne. The Sydney–Louisburg railway serves Reserve Mines, Bridgeport, Glace Bay, Dominion, Port Morien, Mira and Louisburg.

FIGURE 3. Principal towns, roads and railways.

Cape Breton is well served with paved highways. Route 19 runs from Port Hastings to Margaree Forks, where it joins the Cabot Trail. From Margaree Forks, it runs through Northeast Margaree and joins Route 5 at Baddeck. Route 4 runs from Port Hawkesbury to Glace Bay via St. Peters, East Bay and Sydney. Route 28 runs from Sydney to Glace Bay via Victoria Mines, New Waterford and Bridgeport. Other paved highways connect Louisburg with Sydney, and Grand Anse with Arichat and Petit-de-Grat Bridge on Isle Madame. A network of secondary roads connects the towns and communities with major trunk highways.

Many products are carried to and from the Island by ships, along the coastal waters and through the Bras d'Or Lakes. Iron ore is brought to Sydney

from the Wabana Mines in Newfoundland and coal is shipped to European markets. Steamship passenger and freight service is maintained between North Sydney and Port aux Basques, Newfoundland.

The principal market for local farm produce is the Sydney area, and considerable produce has to be imported. During the spring and summer, fluid milk is supplied from local areas and from Antigonish, but during the winter it is brought from as far away as Truro. Vegetables are produced near Sydney, but some are imported from the Annapolis Valley and other centers.

Fish, caught in waters off the coast, are sold on local and international markets. Steel products also are marketed both internationally and locally.

## FACTORS IN SOIL FORMATION

Soil formation and development are influenced by climate, parent material, vegetation, drainage, topography and time. In this section these factors are discussed in their relation to soil development on Cape Breton Island.

### Climate

Climate governs, to a large extent, the intensity or rate at which soil develops. It is a major factor in soil formation. It also determines the kind of vegetation and hence the kind and amount of organic matter that is added to the soil.

There are wide variations in local conditions, so that measurements of precipitation and temperature at a few sites give only a general indication of the climate. Also, temperature and moisture conditions near the surface of the soil may differ greatly from those several feet above it. Such conditions of microclimate may affect local variations in soil development.

In general, lowland areas have higher mean temperatures and lower humidity than upland areas and the soils warm up earlier in the spring.

There are four weather stations on the Island where records have been kept for a number of years: Glace Bay, on the east coast; Sydney, less than 10 miles west; Baddeck, on Bras d'Or Lakes; and Cheticamp, on the west coast.

There is little difference in the mean seasonal or annual temperatures between the four stations (Table 1). However, these are averages and there are many local variations. There is a considerable difference in annual precipitation. At Cheticamp the average frost-free period is 156 days, but at Frizzleton it is only 62 days (Table 2). There is considerable difference in elevation between these two stations, and also the Cheticamp station receives the modifying effect of winds off the water. The date of the latest spring frost ranged from April 30 at Port Hastings to July 9 at Frizzleton. That of the earliest fall frost ranged from August 10 at Frizzleton to November 13 at Cheticamp.

The data compiled at the weather stations indicate the climate at four selected locations on the Island. However, the data at the Sydney and Baddeck stations probably represent the general range in climate of the inland lowland areas. The Glace Bay records give an indication of the climate along the southern coast, and those for Cheticamp are probably applicable to the climate of the upland and highland areas. There will be many local variations.

Thornthwaite[1] has devised a method for determining the effectiveness of precipitation by comparing precipitation with water need, or potential evapotranspiration. By this system the potential evapotranspiration can be computed for any area for which the mean temperature and precipitation are known. It is assumed that the soil can store the equivalent of four inches of rainfall. If the rainfall exceeds evaporation, a surplus results. In the Island this usually

[1] Thornthwaite, C. W. An approach towards a rational classification of climate. Geogr. Rev. 38: 55-94.1948.

**Table 1.—Average Monthly and Seasonal Temperatures and Precipitation at Four Stations in Cape Breton Island[1]**

| | Glace Bay (15 years) | | Sydney (67 years) | | Baddeck (6 years) | | Chéticamp (6 years) | |
|---|---|---|---|---|---|---|---|---|
| | Temperature °F. | Precipitation Inches | Temperature °F. | Precipitation Inches | Temperature °F. | Precipitation Inches | Temperature °F. | Precipitation Inches |
| December | 27 | 5.21 (16.0)[2] | 29 | 5.45 (17.6) | 28 | 4.47[3] | 29 | 4.52[3] |
| January | 21 | 5.24 (22.2) | 22 | 5.16 (23.8) | 21 | 3.42 | 22 | 4.43 |
| February | 20 | 4.58 (18.9) | 20 | 4.42 (24.9) | 19 | 3.42 | 20 | 3.73 |
| Winter | 23 | 15.03 (57.1) | 24 | 15.03 (66.5) | 23 | 11.31 | 23 | 12.68 |
| March | 25 | 5.14 (18.5) | 27 | 4.45 (17.4) | 26 | 4.25 | 27 | 3.00 |
| April | 33 | 4.56 (11.2) | 36 | 4.03 (8.8) | 36 | 4.66 | 36 | 3.06 |
| May | 43 | 4.06 (0.9) | 46 | 3.44 (0.5) | 46 | 3.77 | 46 | 2.64 |
| Spring | 34 | 13.76 (30.6) | 36 | 11.92 (26.7) | 36 | 12.68 | 36 | 8.70 |
| June | 53 | 3.70 | 56 | 2.84 | 55 | 4.00 | 56 | 2.90 |
| July | 62 | 4.20 | 64 | 3.37 | 63 | 3.09 | 65 | 2.68 |
| August | 62 | 3.94 | 64 | 3.75 | 64 | 3.50 | 64 | 2.42 |
| Summer | 59 | 11.84 | 61 | 9.96 | 60 | 10.59 | 61 | 8.09 |
| September | 56 | 4.49 | 57 | 3.46 | 57 | 3.97 | 58 | 3.89 |
| October | 46 | 4.54 (0.8) | 48 | 4.70 (0.2) | 47 | 5.27 | 49 | 3.73 |
| November | 36 | 5.57 (5.2) | 38 | 5.17 (4.5) | 39 | 5.58 | 39 | 3.89 |
| Fall | 46 | 14.60 (6.0) | 48 | 13.33 (4.7) | 47 | 14.82 | 49 | 11.51 |
| Year | 40 | 55.23 (93.7) | 42 | 50.24 (97.9) | 42 | 49.40 | 43 | 40.98 |

[1]From reports of the Meteorological Branch, Air Services, Department of Transport, Ottawa.
[2]Snowfall (10 inches of snow = 1 inch of rain).
[3]Snowfall not recorded.

occurs during the fall, winter and spring. During the summer, evapotranspiration usually exceeds rainfall and a deficiency may occur. In an average year the soil moisture is reduced little by evaporation during the summer at the Glace Bay station (Figure 4). But the reduction is fairly high at the Sydney station and in some years there may be a moisture deficiency. Also, very sandy soils do not hold the equivalent of four inches of rainfall and are severely deficient in moisture during an extended dry period in the growing season.

**Table 2.—Average Dates of Frost and Numbers of Frost-Free Days at Several Stations in Cape Breton Island**

| Station | Elevation Feet | Frost-free period: Average Dates | Average Days | Longest | Shortest |
|---|---|---|---|---|---|
| Cheticamp | 1,100 | May 18 — Oct. 21 | 156 | 188 | 136 |
| Frissleton | 150 | June 26 — Aug. 27 | 62 | 96 | 32 |
| Port Hastings | 45 | May 22 — Oct. 19 | 150 | 186 | 101 |
| St. Paul Island | 99 | May 23 — Oct. 29 | 159 | 185 | 136 |
| Baddeck | 50 | June 6 — Sept. 30 | 116 | 142 | 82 |
| Sydney | 48 | May 29 — Oct. 13 | 137 | 171 | 88 |
| Sydney Airport | 197 | May 22 — Oct. 17 | 148 | 168 | 114 |

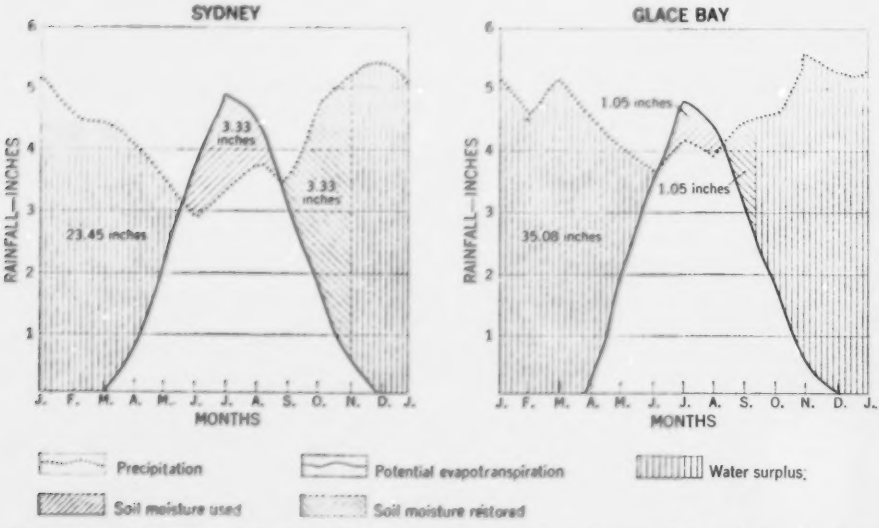


**Figure 4. Monthly changes in precipitation and soil moisture conditions at two stations in Cape Breton.**

## Natural Vegetation

Vegetation is an important factor in soil formation and development. On decaying, it adds organic matter to the soil and this material has a considerable effect on soil forming processes, including biological activity.

There are about 2,700 square miles of productive forest land on the Island. Roughly 65 per cent of this land is covered with softwood, 6 per cent with hardwood and the remainder with softwood–hardwood stands. White and red spruce and balsam fir are the main conifers. These are interspersed with small

amounts of pine, tamarack and black spruce. Conifers dominate the lowland areas and cover much of the upland plateau as well. Deciduous trees occupy many of the mountainous slopes, a few small areas of the lowlands and some of the highland areas. The main species are maple, yellow birch, wire birch, poplar, ash, beech and alder. Mixed stands occur on well-drained sites, usually on the mountains.

The nonproductive forest areas are largely cleared farm land, peat bogs, and a few fire barrens. Fairly large areas in the Cape Breton National Park have sparse, stunted vegetation, chiefly of black spruce and tamarack. Here, poor drainage restricts tree growth.

Drainage influences the type of trees that grow in an area. The well-drained soils support such species as white and red spruce, fir, maple, yellow birch, poplar and beech. Imperfectly drained sites have a cover of spruce, fir, wire birch, tamarack and maple. On poorly drained sites the species are usually red spruce, black spruce, tamarack, wire birch, fir and alder. Very poorly drained sites are often occupied by peat bogs, composed mainly of sphagnum moss, sedges and cotton grass, with black spruce, tamarack and alder around the edges. On the uplands, balsam fir is the chief conifer. It is more suitable for pulpwood than for saw timber.

In Inverness and Victoria counties, much land once cleared for farming and heavily pastured is reverting rapidly to spruce forest. Small spruce trees are unpalatable to livestock and survive in heavily grazed areas, whereas fir and hardwood seedlings are grazed off. In contrast, where there has been little or no grazing on cleared areas, the dominant new growth is balsam fir.

In the industrial area of eastern Cape Breton Island the vegetation is chiefly scrub poplar and wire birch. The slow growth and poor reproduction of economic forest species in this area is probably due to industrial fumes that affect conifers and some hardwoods. Ground cover in these areas is largely labrador tea, lambkill, huckleberry, blueberry and numerous other small, commercially useless shrubs.

## Parent Materials

The characteristics of the parent materials determine to a large extent the kind of soil that develops. On the Island these materials are derived chiefly from the underlying rocks. Since the rocks differ widely in hardness, texture and resistance to weathering, the parent materials derived from them differ greatly in depth and texture, as well as mineralogical composition. The dip and strike of the rock formations may also determine the relief and drainage of the area.

The underlying rocks of the Island (Figure 5) can be grouped into three main classes: Carboniferous conglomerate, shale, sandstone, gypsum and limestone formations in the lowland plains and valleys; Cambrian slates of variable texture and hardness, found chiefly southeast of the Mira River; and Precambrian igneous and metamorphic rocks, which underlie the upland and mountainous areas. The weathering of these three groups of rocks produced materials with a wide range of texture and stoniness.

During the last glacial period thousands of years ago, Cape Breton Island, in common with most of Canada, was covered with a thick sheet of ice. Weathered and unweathered materials derived from the underlying rock strata were mixed and transported by the ice and glacial melt water. They were deposited either as unsorted glacial drift or as sorted materials in kames, eskers or outwash plains. These glacial and glaciofluvial deposits are the parent materials of the present-day soils.

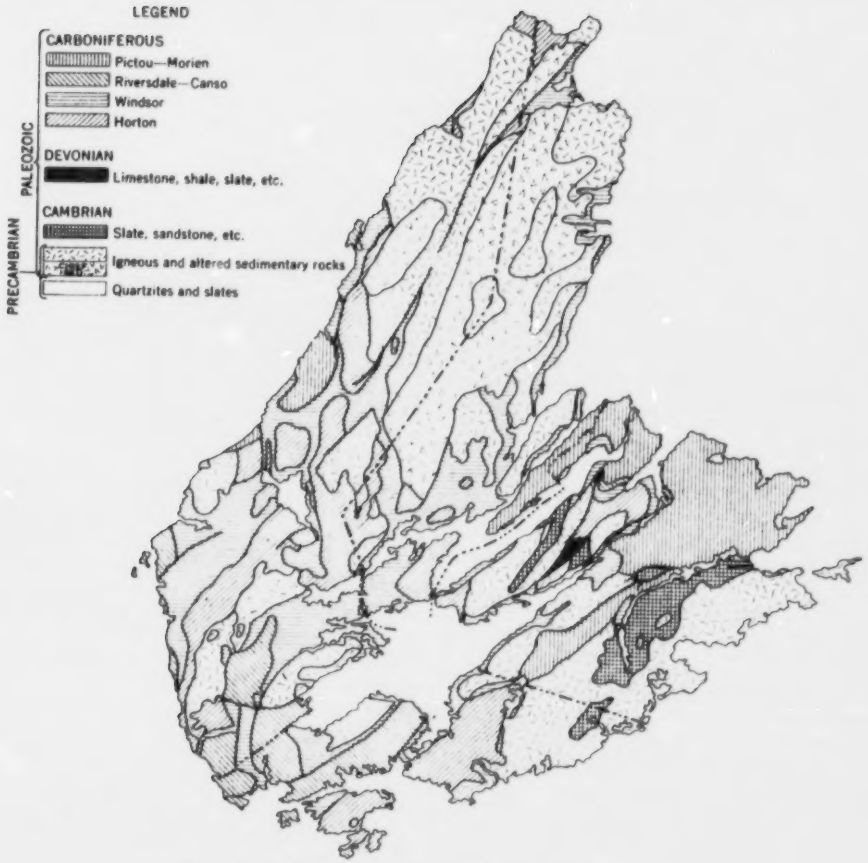


FIGURE 5. Geological formations of Cape Breton Island.

Moderately fine textured glacial till covers half the lowland area (Figure 6). It has been derived from fine-grained, reddish-brown Carboniferous rocks and has a clay loam texture. It is moderately to slowly permeable to water and ranges from slightly to moderately stony. Where gypsum has been mixed with the material, it is more readily permeable to water and is better drained. Several areas of moderately fine textured till derived from gray shale also occur. This material is drab gray, is only slowly permeable and is mottled with rusty streaks, some of which are from decomposing shale within the till. Most of the moderately fine textured tills are several feet or more deep.

Medium-textured till occurs chiefly on the Cambrian formations. In these areas the slate has weathered sufficiently to produce a till of loam to shaly loam texture. Large areas of this formation are made up of more resistant rocks, however, so that only small areas are sufficiently stone-free for agricultural use.

Moderately coarse textured materials cover the remainder of the lowland plains. These are derived mainly from reddish-brown to gray sandstones of the Carboniferous age. They have a sandy loam texture and are fairly permeable to water, but have a wide range of stone contents and are shallow over large areas.

On the mountain slopes and crests where the harder rocks prevail, the till is a coarse sandy loam to stony sandy loam. Usually the deposit is thin and the bedrock is close to the surface.

LEGEND
Clay loam and gravelly clay loam till
Shaly loam till
Sandy loam and stony sandy loam till
Outwash sands and gravel
Recent alluvial deposits

FIGURE 6. Parent materials of Cape Breton soils according to texture.

Water-deposited materials of glaciofluvial origin consist of deep sands and stratified sands and gravels. The soils developed thereon range in texture from gravelly sandy loam to loamy sand. The materials have low moisture-holding capacity, but are generally free of large stones.

Along many of the present-day streams there are alluvial deposits of recent origin, reddish brown in color and fine sandy loam to silt loam in texture. They have not been in place long enough to show the effects of the soil development processes.

Throughout the Island there are numerous small areas of organic deposits, usually formed by the gradual filling of lakes and bogs. Most of the material consists of slightly humified to humified sphagnum moss, sedges and woody material. Along the coast a number of sandy beaches have potential soil material, but have no significance as soils at present.

### Topography and Drainage

Topography and drainage are responsible for differences in soils formed from the same kind of parent material. Likewise, topography and the kind of parent material determine the amount of water that percolates through or is held by the soil.

The two main physiographic divisions in Cape Breton Island are the lowland plains and the upland plateaus (Figure 7). The lowland plain, underlain mostly by Carboniferous rocks, is undulating to gently rolling. Elevations range from sea level to about 500 feet. Where gypsum occurs there are numerous sinkholes, giving rise to a hummocky or karst topography. Most of the agricultural land lies in this lowland plain.

The upland plateau, formed from igneous and metamorphic rocks, is the resistant portion of an old peneplain extending from near sea level at Louisburg to elevations of 1,000 feet or more at Cape North. In the southern part of the Island the peneplain is split into a number of sections: Craignish Hills, Mabou Mountain, North Mountain, Boisdale Hills, East Bay Hills, Mira Hills, Sporting Mountain, Kelly Mountain and Coxheath Hills.

The northern plateau is dissected by numerous streams, which have their origin in the plateau and drop to the lowlands through steep gorges. On the western side of the Island the main rivers are the Grand Anse, Cheticamp, Margaree, Mabou, Mull and Graham; these flow into the Gulf of St. Lawrence or Northumberland Strait. The east and south sides of the Island are drained by the Aspy, Ingonish, North, Mira, Catalogne, Framboise, Grand, Tillard and Inhabitants rivers, which flow into the Atlantic Ocean. The Baddeck, Skye, Black, Washabuck, and Middle rivers drain into Bras d'Or Lakes. The rivers and brooks of the Island provide adequate surface drainage and some fine trout and salmon fishing. To date, electric power on the Island has been produced entirely by thermal units. The potential for hydroelectric development on the Island is significant, particularly in the northern highlands.

## SOIL DEVELOPMENT AND CLASSIFICATION

In Cape Breton the soil-forming factors have been at work since the melting of the ice sheet about 10,000 years ago. Under the influence of the various factors, soluble salts and fine clay particles are leached downward. These are either deposited at lower depths or removed in the drainage water. This results in the formation of layers or horizons, parallel to the earth's surface, that differ in physical characteristics and chemical composition. A vertical section through these layers is called the soil profile.

The upper part of the profile, or A horizon, consists of the layer or layers from which constituents have been removed. It is underlain by the zone of accumulation, the B horizon, in which materials from the A horizon have been deposited. The C horizon, underlying the B, is the unweathered material similar to that from which the upper horizons have developed. Subdivisions may be made within each horizon according to observable differences in characteristics.

FIGURE 7. Main heights of land and rivers of Cape Breton.

The effects of the soil-forming factors are best observed in soils that have developed on well-drained, moderately coarse textured parent materials. In Cape Breton, such soils have an A horizon with a thin layer (L-H) of partly decomposed organic matter in the upper part. The lower part of this horizon (Ae) is a bleached, light-colored layer from which bases, clay, and iron and aluminum compounds have been removed. The B horizon is dark-colored and usually somewhat finer in texture than the Ae. It contains the materials leached down from the A horizon. It may be designated as Bh when humus is largely responsible for the color, as Bf when the coloring is caused largely by iron compounds or as Bfh when both substances are responsible for the color. In some places, this horizon is indurated, or cemented, and it may then be designated as Bfhc. The C horizon is usually lighter in color than the B and more firm and dense.

Soils having these characteristics are known as Podzols. There is a large group of them in Cape Breton. In general, the profile is described as follows:

| *Horizon* | *Description* |
|---|---|
| L-H | Black, semidecomposed organic matter; transition to Ae abrupt. |
| Ae | Light-gray to pinkish-gray mineral soil; loose and friable. |
| Bfh | Dark-brown to reddish-brown mineral soil becoming lighter in color with depth; usually finer textured than Ae. |
| Bf | Yellowish-brown to light reddish brown mineral soil. |
| C | Unweathered parent material; various textures, colors and consistencies. |

In another large group of soils in Cape Breton, development has been restricted by poor drainage and consequent lack of aeration. These soils are usually found at the feet of slopes, on low-lying areas or on nearly level land where a compact subsoil restricts the downward movement of water. These soils differ from the well-drained Podzol soil in certain characteristics. Usually the L-H horizon contains more organic matter and is thicker. The Ae and B horizons may be mottled with gray and yellowish brown because of reduction of the iron compounds in the presence of organic matter. This reduction process is called gleying. Gleyed horizons are indicated by attaching the suffix *g* to the main horizon designation. As a group, these soils are known as Eluviated Gleysols. An Eluviated Gleysol profile is described as follows:

| *Horizon* | *Description* |
|---|---|
| L-H | Black, semidecomposed organic matter; often mucky in appearance. |
| Aeg | Dark-gray to dark reddish gray mineral soil; mottled with light and dark patches or splotches. |
| Bg | Light-brown to light reddish brown mineral soil; strongly mottled with gray or strong-brown colors; usually less strongly mottled with depth. |
| C | Unweathered parent material; usually firm to impervious; moderately to weakly mottled. |

In the very poorly drained sites, the mottling may be much subdued and the lower horizons may be dull gray.

Another group of soils found in Cape Breton are the organic deposits. These occur in depressional areas and where the soil is saturated with water most of the year. These soils do not have the well-developed horizons of the mineral soils, but rather successive layers of organic material—chiefly moss and sedges—in various stages of decomposition from the surface downward. Most of these soils are classed as peat.

Along the present stream courses throughout the area, sediments have been deposited on flood plains. These materials have not had enough time to develop profiles. They are immature soils, or Regosols.

## How The Soils Were Mapped

Within each of the great soil groups there are local variations in characteristics such as texture, color or consistency or in parent material. On this basis the soils are separated into smaller groups, or soil series. All the soils in a series have developed from the same kind of parent material, have the same drainage and the same kind of profile. Each series may be divided into soil types, based on the texture of the surface soil. The soil type was the unit of mapping used in Cape Breton.

The soil profiles were examined in pits dug in fields and forested areas and in the roadside exposures found in many parts of the surveyed area. The soils were examined near all roads and trails. The boundaries between the various soil types were plotted on base maps on a scale of two inches to one mile.

Differences in slope and stoniness for each type were recorded. Notes were taken on the vegetation, crops, suitability for use, and present agricultural practices in the various soil types.

At the end of the survey, samples were taken of the major soil types for physical and chemical analyses. These analyses are given near the end of this report.

### Classification of the Soils

The soil series found in Cape Breton are grouped in Table 3 to show their main relationships. The major differences in the soils are associated with differences in the texture and composition of the parent materials.

The soils in each horizontal row of Table 3 are developed from the same kind of parent material. They differ in characteristics produced by differences in drainage, such as the presence of mottling, accumulation of surface organic matter, or degree of development. The soils in each column have the same kind of profile, but become coarser in texture toward the bottom of the table.

The common properties of soils in the same textural group in any column permit grouping of soils such as Queens, Millbrook and Diligence into families. Members of a family have similar land use and management requirements as well as somewhat similar morphological features. There may be several families in one textural class. There are a few miscellaneous soils such as coastal beach and salt marsh whose places in the classification scheme are not yet fixed.

## DESCRIPTIONS OF THE SOILS

Soils developed from glacial till occupy about 56 per cent of the Island. About 60 per cent of these are well drained, 30 per cent imperfectly drained and the rest poorly drained. Soils with glaciofluvial parent materials occupy about 3.5 per cent of the Island. The remaining 40 per cent consists of miscellaneous soils such as peat, salt marsh and rough mountain land.

In the following descriptions of the soils, the color is described by a descriptive term followed by a set of symbols denoting the color in the Munsell Color System. The colors given are for moist soils.

### Soils Developed from Fine-textured Parent Materials

The soils of this group occupy about 16.5 per cent of the surveyed area. The well-drained series, Falmouth and Woodbourne, make up about 21 per cent and the imperfectly drained series, Queens, Millbrook and Diligence, about 65 per cent of the area covered by this group. The remainder is occupied by the poorly drained Kingsville and Joggins soils. Most of the cultivated soils of Cape Breton Island are in these series.

#### Falmouth Series (16,481 acres)

The Falmouth soils occupy less than 1 per cent of the surveyed area, but they are important agricultural soils. They are found mainly near Cheticamp, South Gut St. Ann's, Mabou, Orangedale, Melford and Upper River Denys. Smaller areas of a few to several hundred acres are found in other parts of the Island. About 70 per cent of the Falmouth soils are found in Inverness County.

These soils have developed from a reddish-brown clay loam till deposited over gypsum. Some of the gypsum was mixed with the till and this has improved the structure and permeability of the material so that the drainage is better than in other fine-textured soils. As the underlying gypsum is slowly dissolved by underground waters, pits and sink-holes develop. These are interspersed with closely spaced knolls or nearly level land. Usually the till is 6 to 15 feet thick, but there are occasional outcrops of gypsum.

**Table 3.—A Classification of the Soils of Cape Breton**

| Parent Material | Lithology | Podzols | | | Eluviated Gleysols | Regosols | | Organic Soils |
|---|---|---|---|---|---|---|---|---|
| | | Orthic Podzols | Gleyed Podzols | | Low Humic Eluviated Gleysols | Orthic Regosols | Gleyed Regosols | |
| | | Good drainage | Imperfect drainage | Poor drainage | | Good drainage | Imperfect drainage | |
| Fine-textured glacial till | Red and gray shales and sandstones | Falmouth | Queens | | Kingsville | | | |
| | Reddish-brown sandstone and shale<br>Gray shale and sandstone | Woodbourne | Millbrook<br>Diligence | | Joggins | | | |
| Medium-textured glacial till; alluvium | Gray shale<br>Reddish-brown sediments | Kirkhill | | | | Cumberland | Bridgeville | |
| Moderately coarse-textured glacial till | Metamorphic rocks<br>Granite<br>Reddish-brown conglomerate<br>Gray sandstone and shale | Thom<br>Gibraltar<br>Westbrook<br>Shulie | Mira<br>Bayswater<br>Springhill | Arichat<br>Aspotogan<br>Economy | | | | |
| Coarse-textured water-deposited materials | Reddish sandstone and shale<br>Igneous and metamorphic rocks<br>Gravel over till<br>Shaly gravel | Canning<br>Hebert<br>Digby<br>Torbrook | Kingsport<br>Comeau | Millar<br>Meteghan | | | | |
| Organic deposits | | | | | | | | Peat |

There is not much surface stone on these Falmouth soils and the topography usually determines how the land may be used. The vegetation is a mixed stand of birch, red maple, sugar maple, red spruce, white spruce and poplar. A representative profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, semidecomposed organic matter; greasy mor; pH 3.9. |
| Ae | 0- 2 | Pinkish-gray (5 YR 6/2)[1] silt loam; slightly plastic; pH 4.0 |
| Bfh | 2-10 | Reddish-brown (5 YR 4/3) clay loam; medium, subangular blocky structure; slightly firm; moderately plastic; pH 5.0. |
| Bf | 10-30 | Reddish-brown (2.5 YR 4/4) clay loam; medium, subangular blocky structure; firm; moderately plastic; pH 5.0. |
| C | 30+ | Dark reddish brown (2.5 YR 3/4) clay loam; subangular blocky structure; firm; plastic; small stones; pH 4.9. |

In general these soils become slightly finer textured with depth. In some places, such as in the Melford area in Inverness County, the upper part of the solum may be a sandy loam. Then the upper part of the B horizon is lighter in color and may be somewhat coarser in texture than usual. The Falmouth soils usually have well-developed structure and good drainage. The cultivated soil is a dark-brown, friable loam to silt loam.

*Use*

Use of the Falmouth soils is limited chiefly by topography and somewhat by stoniness. About 7 per cent of them are suitable for cultivation of all crops grown in the surveyed area, with few or moderate limitations. Most (70 per cent) of the series is moderately good land that is limited for crop use because of slope and, to some extent, by stoniness. Most of this land is in hay or pasture. Adequate protection against erosion is necessary if crops are rotated on this land. The rest of the Falmouth soils are unsuitable for crops because of steep slopes; some of these areas are suitable for permanent pasture, but most are best suited to forest.

Hay and grain are the principal crops on these soils. Small acreage of potatoes and other vegetables are grown on the more favourable locations. Yields are low unless fertilizer is used. The soils are rather highly acid on the surface and respond well to liming. In most cultivated areas, the physical condition of the soil could be improved by the addition of organic matter. The chief problems are erosion and inadequate fertility.

### Woodbourne Series (77,421 acres)

The Woodbourne soils occupy nearly 3 per cent of the surveyed area and are found in all counties except Cape Breton County. In Inverness County, where about 65 per cent of these soils occur, they are found at the higher elevations of the lowland plain on both sides of the Craignish Hills. On the west side of these hills they extend from Craigmore to north of Mabou. On the east side they are found near Kingsville, Princeville and Glendale. Other fairly large areas occur near River Bourgeois, St. Peters and Barra Head in Richmond County. The Woodbourne soils are generally associated with the Millbrook soils, which lie at lower elevation.

The parent material of these soils is a gravelly clay loam glacial till. It is similar to the parent material of the Falmouth and Queens soils, but contains more gravel. It was derived from fine-grained sandstone and shale that contains lime carbonate in some places. The material ranges from less than a foot to several feet in thickness over the bedrock. Usually the shallow areas are more stony than those where the till is thick.

[1] Munsell color notation. Munsell Color Company Inc. Baltimore, Md.

The topography ranges from rolling to hilly and some of the land has steep slopes. Surface drainage is usually rapid and the steeper slopes are easily eroded. Internal drainage is usually moderately rapid. The principal trees are red spruce, white spruce, wire birch, red maple, sugar maple, and some poplar. A profile under forest is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L–H | 2– 0 | Black, semidecomposed organic matter; fibrous mor; pH 3.7. |
| Ae | 0– 2 | Reddish-gray (5 YR 5/2) silt loam; weak crumb structure; friable; pH 3.9. |
| Bfh | 2–10 | Reddish-brown (5 YR 4/4) silt loam; well-developed crumb structure; friable; porous; pH 5.0. |
| Bf | 10–18 | Dark reddish gray (5 YR 4/2) silt loam; subangular blocky structure; gravelly; firm; pH 5.0. |
| C | 18+ | Dark reddish brown (5 YR 4/3) silt loam; compact; porous; gravelly; pH 4.9. |

These soils commonly have a purplish cast in the lower horizons that distinguishes them from the Queens and Millbrook soils. Where the surface texture is a sandy loam, the upper horizons are lighter in color than usual and very friable.

*Use*

Large areas of the Woodbourne soils that have been cleared are not used for agriculture now. The most favorable areas for cultivation are in Richmond and Victoria counties. About 8 per cent of the soils are suited for cultivation with only simple management practices. Another 62 per cent, or about 48,000 acres, have slopes ranging from 8 to 16 per cent and are not too stony for cultivation. The lower ranges of these slopes, with careful management practices, could be used for cultivated crops, but the steeper land is better suited for pasture. Strip cropping, terracing or contour planting would help to prevent erosion and increase the area on which hoed crops could be grown. The rest of the Woodbourne soils are steeply sloping, shallow or stony and are best suited to permanent pasture or forest.

Some excellent crops of hay, grain and vegetables are grown on these soils. They respond well to fertilization, and liming seems to be necessary for best results. On slopes that have been in hay or pasture for many years, much of the surface soil has been removed by sheet erosion, and it is necessary to build up the organic matter when these soils are cultivated. Woodbourne soils designated as B-3 or C-3 on the soil map may make good permanent pasture, but the areas with D slopes should be left in forest.

### Queens Series (115,040 acres)

The Queens soils are among the most important agricultural soils of the survey area. They occupy slightly more than 4 per cent of the total land area of the Island, but are about 20 per cent of the potential crop land. The largest areas of Queens soils are found in Inverness County, along the coast from Judique to Mabou and in the River Denys–Orangedale area. Smaller areas occur in Richmond and Victoria counties at Plaster Mines, Little Narrows, Middle River, and east of Port Hawkesbury. Queens soils are associated with Millbrook, Falmouth and Kingsville soils.

The parent material is a moderately plastic, reddish-brown, clay loam glacial till that varies considerably in stone content. It is only slowly permeable to water and becomes finer in texture with depth. The slow movement of water through the soil results in mottling of the colors of the upper horizons and is reflected, to some extent, in the vegetation.

The Queens soils occur on topography that ranges from gently undulating to steeply sloping, but most of the soils are on undulating to rolling land, and only a few areas are excessively stony.

The principal vegetation is red spruce, white spruce, balsam fir, red maple and some wire birch. Occasionally some tamarack and poplar are seen on the Queens soils, but spruce is the dominant tree species. A profile under forest is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, fibrous mor; F layer thick; pH 3.9. |
| Ae | 0- 5 | Very pale brown (10 YR 8/3) loam; friable; some roots; some stone fragments; pH 4.2. |
| Bfg | 5-10 | Reddish-brown (5 YR 5/3) clay loam; medium, subangular blocky structure; friable; plastic, strong-brown mottles; pH 4.5. |
| Bg | 10-20 | Reddish-brown (2.5 YR 4/4) loam; medium blocky structure; firm; moderately plastic; strongly mottled; a few stones; pH 5.5. |
| C | 20+ | Dark reddish brown (2.5 YR 3/4) clay loam; massive; firm; plastic; some mottling; pH 7.7. |

The boundaries between horizons are indistinct or diffuse. Sandy spots sometimes occur in the profile due to the decomposition of the sandstone fragments. In most profiles the mottling becomes indistinct below the Bfg horizon. Many of the cleavage faces of the larger peds are coated with grayish silt and clay particles and there are clay coatings along root channels and ped surfaces to a considerable depth. In the spring of the year the Ae horizon is saturated with water because of the slow permeability of the underlying B horizon. The cultivated soil is a dark-brown loam to clay loam.

*Use*

A considerable proportion of the Queens soils are used for farming. Stoniness interferes with cultivation in some areas, but generally the soils can be cultivated without difficulty. Drainage is one of the major problems.

About 47 per cent of these soils, or 54,000 acres, are suitable for most crops grown on the Island if attention is given to water management and erosion. This type of land is well suited to hay, forage crops or permanent pasture. Another 43 per cent of the soils have steep slopes. This improves surface drainage but increases the danger of erosion, especially when hoed crops are grown. Such slopes are better suited to hay or permanent pasture. The remainder of the Queens soils are too steep or stony for cultivation. A few areas are suitable for permanent pasture, but forest is the best use for this land.

In cultivating the Queens soils it is necessary to work them when moisture conditions are favorable. If these soils contain too much moisture they tend to puddle, and bake when dry. This management factor is as important a.. fertility on these soils. Liming is essential for good stands of hay and forage crops. It also helps to promote better structure and improve the drainage, which is a distinct advantage, since these soils tend to be late in the spring. The Queens soils are low in natural fertility and require fertilizer for good yields of most crops. Keeping up organic matter levels improves the physical condition and productivity of the soil.

### Millbrook Series (120,694 acres)

Millbrook soils are associated with Queens, Woodbourne, Falmouth and Kingsville soils. They occupy 4.6 per cent of the area and occur in every county, the major proportion being in Inverness and Richmond counties. Some of the

larger areas occur west of Orangedale and north of River Denys Center, south and east of West Bay, near Baddeck, Upper Southwest Mabou and around Ashfield.

The parent material is a reddish-brown clay loam till similar in appearance to the Queens soil material, but it is more compact and contains more gravel. Most of the Millbrook soils have a rolling topography with long, moderate slopes. Water runs down these slopes over the compact parent material and moistens the soil in the lower part of the solum. In some locations the Millbrook soils have considerable surface stone, which limits their use. Tree cover is a mixed stand of balsam fir, red spruce, white spruce, red maple, wire birch and poplar. A typical profile under forest is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 3- 0 | Grayish-black matted mor; pH 4.0. |
| Ae | 0- 3 | White (10 YR 8/2) silt loam; friable; slightly firm; structureless; some stones; pH 4.2. |
| $Bfg_1$ | 3- 8 | Reddish-brown (5 YR 4/4) loam; moderately firm; structureless; light-brown mottles; pH 5.0. |
| $Bfg_2$ | 8-15 | Reddish-brown (5 YR 4/3) clay loam; firm; plastic; mottled; gravelly; pH 4.9. |
| C | 15+ | Dark reddish brown (2.5 YR 3/4) gravelly clay loam; firm; plastic; numerous small stones; massive; pH 6.3. |

These soils somewhat resemble the Queens soils, but are distinguished by the presence of a compact C horizon that contains considerable gravel. The cultivated soil is a brown to reddish-brown clay loam. In the better-drained locations, the B horizon is more brown and there is only faint mottling in the profile. Imperfect drainage is due to seepage of water down the slopes over the compact subsoil. In several locations the surface texture is a sandy loam. Many cleared areas have rock piles of igneous and metamorphic rocks that are found in the parent material.

*Use*

The cleared Millbrook soils are used chiefly for hay and pasture. About 18 per cent of the soils have topography and freedom from stoniness (B-2) favorable for the cultivation of most crops grown in the area. Adequate drainage and suitable precautions for erosion control are necessary. In general, hoed crops are not as successful on the Millbrook soils as on some of the coarser-textured soils of the Island.

About 68 per cent of the Millbrook soils occur on long slopes ranging from 8 to 16 per cent and are very stony. Many of these slopes are now in hay or pasture, but the steeper slopes should remain in forest. Sheet erosion on these long slopes results in loss of good topsoil and natural fertility and brings the compact subsoil closer to the surface. The Millbrook soils are suited to grass and grain crops and good yields are obtained when fertilizers are used.

### Diligence Series (50,174 acres)

The Diligence soils occupy about 2 per cent of the surveyed area. They occur in all the counties, but are most widespread in Inverness and Richmond counties. Some of the larger areas are on the west side of Lake Ainslie, around Inverness, along Upper Baddeck River and on the north end of Boulardarie Island.

The parent material of these soils is a plastic, clay loam till derived chiefly from gray and black slates and shales. It is usually grayish in color, but may have a reddish cast in some locations. The shales are interbedded with gray sandstone and occasionally these rocks outcrop on the surface. Diligence soils are associated with the Queens and Millbrook soils.

The topography ranges from gently rolling to hilly, most of the steeper slopes occurring in Inverness and Victoria counties. In Cape Breton County the soils are more nearly level than in the other counties. The texture and structure of the parent material tend to restrict water movement and the soils have moderately slow internal drainage. Usually there is enough slope to provide adequate surface drainage. The shaly parent rock is easily weathered, and consequently the soils are not very stony except where the till is thin and the interbedded sandstone has been mixed in the till.

Tree cover is a mixed stand of balsam fir, red spruce, white spruce, red maple, yellow birch, poplar and alder. Occasionally there is an undercover of dogwood, lambkill and moss. A profile under forest is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Very dark brown (10 YR 2/2), semidecomposed organic matter; greasy mor; pH 4.2. |
| Ae | 0- 3 | Pinkish-gray (7.5 YR 6/2) loam; very weak platy structure; friable; slightly firm; pH 3.7. |
| Bfg | 3-10 | Yellowish-brown (10 YR 5/6) silty clay loam; medium, subangular blocky structure; moderately firm; faint, light brownish gray mottles; pH 4.1. |
| Bg | 10-17 | Yellowish-brown (10 YR 5/6) clay; plastic; firm; distinct strong-brown mottles; pH 4.5. |
| C | 17+ | Grayish-brown (10 YR 5/2) clay; firm; plastic; shale and sandstone fragments; diffuse mottling; pH 4.7. |

The color of the C horizon may range from olive-gray to light reddish brown when the soils are adjacent to those having reddish parent materials. The upper B horizon is moderately permeable to water but water movement is restricted by the lower horizons. The cultivated soil is a grayish-brown loam. In some areas the parent material has a clay loam texture and the whole profile may be somewhat lighter in texture throughout.

*Use*

The Diligence soils have not been used much agriculturally, because of location or topography. Most of the cleared areas are used for hay and pasture. Drainage and fertility are the principal problems on these soils. About 55 per cent of them have physical characteristics that make them suitable for crops if suitable water-management practices are followed. The rest of the soils are too steep, stony or shallow for crops and are best suited to permanent pasture or forest.

The Diligence soils have low natural fertility. Liming and fertilization are necessary for successful crop production. The addition of large quantities of organic matter to these soils improves their physical condition.

### Kingsville Series (56,420 acres)

The Kingsville soils are found in all counties of the Island and are most widespread in Inverness and Richmond counties. They are associated with the Queens soils on level to depressional areas. The Kingsville soils occupy about 2 per cent of the Island. The larger areas are found south and east of Glencoe Station in Inverness County and at South Cove in Victoria County. Smaller areas are south of Little Narrows and in other parts of the surveyed area.

The parent material is similar to that of the Queens soils, but it usually contains less stone. It appears to have been water-worked or laid down in shallow water. It is fairly free from stone, although occasional boulders have been left on the surface by glacial ice.

The topography of the Kingsville soils ranges from gently undulating to depressional. The nature of the parent material tends to keep the water table near the surface most of the year. Drainage is a major problem on these soils.

The forest cover is black spruce, tamarack, red maple, poplar and alder. In the more poorly drained areas a thick layer of sphagnum moss may occur on the surface, giving it the appearance of a peat bog. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, fibrous mor; pH 3.9. |
| Aeg | 0- 3 | Light-gray (10 YR 7/2) silty clay; friable; plastic; medium blocky structure; yellowish-brown mottles; pH 4.0. |
| $Bg_1$ | 3- 9 | Yellowish-brown (10 YR 5/8) clay; medium blocky structure; plastic; distinct gray and brown mottles; pH 4.3. |
| $Bg_2$ | 9-21 | Dark reddish brown (2.5 YR 3/4) clay; medium blocky structure; plastic; mottled with yellowish-brown and gray, distinct mottles; no stones; pH 4.8. |
| $C_1$ | 21-36 | Dusky-red (10 R 3/4) clay; massive; moderately firm; plastic; occasional stones; pH 6.3. |
| $C_2$ | 36+ | Dusky-red (10 R 3/4) clay; massive; very plastic; some stones; pH 8.0. |

Where limestone occurs, some lime has been washed into the depressions, giving rise to fairly high pH values in the parent material. In the very poorly drained sites the Bg horizon may be dark reddish gray and the cleavage faces of the soil peds are coated with gray silt and clay. Frequently there is a sharp change in texture between the Aeg and Bg horizons, but below this the texture generally becomes finer with depth. The cultivated soil is a brown to reddish-brown loam.

*Use*

Most of the Kingsville soils are under forest. Cleared areas are used chiefly for pasture. Most of the areas have topography favorable for the use of farm machinery, and stoniness is not a problem in land use. However, the Kingsville soils are difficult to work because of their plastic nature and this also makes drainage a problem. These soils have been cultivated in a few areas and the addition of lime and large quantities of organic matter have improved the physical condition and drainage. Hay and grain crops give good yields when fertilizers are applied.

If this land can be cleared and cultivated economically, there are considerable areas of potential farm land on the Kingsville soils. They support a good forest growth and this is probably their best use where better farm land is available.

### Joggins Series (1,440 acres)

The Joggins soils occupy small areas in all four counties. One of the larger areas occurs near Port Hawkesbury. The parent material of these soils is similar to that of the Diligence soils with which they are associated. The Joggins soils occur on level to depressional topography where drainage is restricted by both relief and parent material. Usually these soils do not have enough stone on the surface to interfere with cultivation, although a small percentage in Richmond County are very stony. The tree cover is mainly balsam fir, black spruce, red maple, tamarack, and wire birch. A typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Very dark gray (5 YR 3/1), semidecomposed organic material; greasy mor; pH 3.5. |
| Aeg | 0- 2 | Pale-brown (10 YR 6/3) loam; weak, thick platy structure; friable; faintly mottled; pH 4.2. |
| Bg | 2-18 | Light yellowish brown (2.5 Y 6/4) clay loam; medium, subangular blocky structure; firm; prominent, numerous, yellowish-brown (10 YR 5/8) mottles; pH 4.3. |
| C | 18+ | Grayish-brown (2.5 Y 5/2) clay loam; coarse blocky structure; prominent, yellowish-brown mottles; firm; plastic; pH 5.2. |

The soil profile usually has a drab appearance with prominent mottling. In some locations the texture is finer throughout the profile than in others.

*Use*

Most of the Joggins soils are under forest. Although the topography and freedom from stone favor the use of farm machinery, the impervious, plastic nature of the soil material, poor aeration and likelihood of erosion are against the use of this land. Associated with this is a low natural fertility which has to be corrected before crops yield well. The Joggins soils are best suited to forest, which does not grow as well as on other soils of the area.

## Soils Developed from Medium-textured Parent Materials

The soils in this group cover only 1.4 per cent of the surveyed area. Well-drained soils comprise about 83 per cent of the group and the rest are imperfectly drained.

### Kirkhill Series (20,936 acres)

The soils of the Kirkhill series occupy less than 1 per cent of the Island. The larger areas of these soils are east of the Mira River in Cape Breton County, and around Bay St. Lawrence in Victoria County.

The parent material is a grayish-brown to olive-gray shaly loam glacial till. The depth of the till varies from several feet to one or two feet where bedrock is close to the surface. The Kirkhill soils occur on gently rolling to hilly topography and have variable stoniness depending on the character of the underlying shale. If it is thinly bedded, there is little stone on the surface, but where the shale is coarse-textured and hard the till is stony and shallow.

These soils have good external and internal drainage. On the steeper slopes, drainage may be excessive. The tree cover is a mixed stand of red spruce, white spruce, gray birch, wire birch, balsam fir, maple and occasional pine. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 2 - 1½ | Leaf litter and fibrous material. |
| F | 1½- ½ | Very dark brown (10 YR 2/2), fairly well decomposed organic matter; fibrous; loose. |
| H | ½- 0 | Black, greasy mor; pH 3.8. |
| Ae | 0 - 2 | Grayish-brown (10 YR 5/2) silt loam; coarse platy structure; organic matter stains; some roots; shale fragments; pH 4.2. |
| Bfh | 2 -10 | Yellowish-brown (10 YR 5/4) silty clay loam; medium crumb structure; some roots; very slightly mottled; pH 4.7. |
| Bf | 10 -18 | Olive (2.5 Y 5/4) silt loam; structureless; some shale fragments; distinct mottles; pH 4.7. |
| C | 18+ | Olive (5 Y 5/3) silt loam; firm; weakly mottled; numerous soft shale fragments; pH 5.0. |

Near the Mira River there is considerable gravel in the profile and the soil may be somewhat coarser in texture than that described above. The cultivated soil is a friable, brown loam.

*Use*

The Kirkhill soils are largely covered with forest. About 20 per cent of the soils have good topography and few stones and are suitable for crops. Another 26 per cent have moderately steep slopes and can be used for hay

or permanent pasture. The remainder should be left in forest. Where the Kirkhill soils are cultivated they require maintenance of organic matter, which disappears rapidly in these soils. Liming and fertilization are necessary for good yields.

### Cumberland Series (14,071 acres)

The Cumberland soils occupy less than 2 per cent of the Island, but they are important agricultural soils. They occur along stream courses in all counties of the Island. The larger tracts are along the Inhabitants, Denys and Margaree rivers.

The parent materials are reddish-brown alluvial sediments ranging in texture from silt loam to very fine sandy loam or sandy loam. These materials have not been in place long enough to develop a mature profile, but exhibit layers due to differences in time and rate of sediment deposition.

The topography ranges from gently undulating to level and the natural drainage is good. The associated, less well drained areas are occupied by the Bridgeville soils. The Cumberland soils are stone-free, although occasional stones may be present in some places. Only a few areas are covered with trees: spruce, red maple, poplar and wire birch. A profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| Aa | 0-10 | Reddish-brown (5 YR 4/3), very fine sandy loam; very friable; pH 4.5. |
| C | 10-28 | Reddish-brown (5 YR 5/3) fine sandy loam; moderately firm; friable; becoming coarser in texture with depth; pH 5.4. |
| | 28+ | Gravel and coarse sand; occasional large cobbles. |

There is considerable range in the depth of these alluvial deposits, but generally the profile varies from 18 to 38 inches over gravel. Surface textures range from silt loam to sandy loam. A few areas of loamy sand were included with the Cumberland soils. The material ranges from dark reddish brown to dark brown, depending on the source of the sediment. The soil usually rests on coarse gravel or a mixture of reddish-brown sand and gravel.

*Use*

The Cumberland soils, because of their accessibility, favorable topography (Figure 8) and freedom from stone, are among the best agricultural soils of the surveyed area. In many cases, their use is limited by seasonal flooding, but this does not usually occur during the growing season. The frost hazard may limit the choice of crops in some areas.

The Cumberland soils are easy to work and have moderately good natural fertility, but will respond to liming and the use of fertilizers. One factor limiting their use is the small size of the areas on individual farms. Usually such areas are used for hay and pasture, but if they were combined they might be useful for commercial production of vegetables. Some larger areas (Figure 9) are now being used for this purpose.

The Cumberland soils require a good supply of organic matter. In most cases they are capable of much better production than they are yielding at present.

### Bridgeville Series (2,435 acres)

There is a relatively small area of Bridgeville soils in the surveyed area. They are associated with the Cumberland soils in all the counties and have similar parent materials. They occupy level to slightly depressional topography where water movement is restricted, and they are free from stone. Like the Cumberland soils, they have not developed horizon characteristics of the more mature soils The effect of restricted water movement is reflected in profile

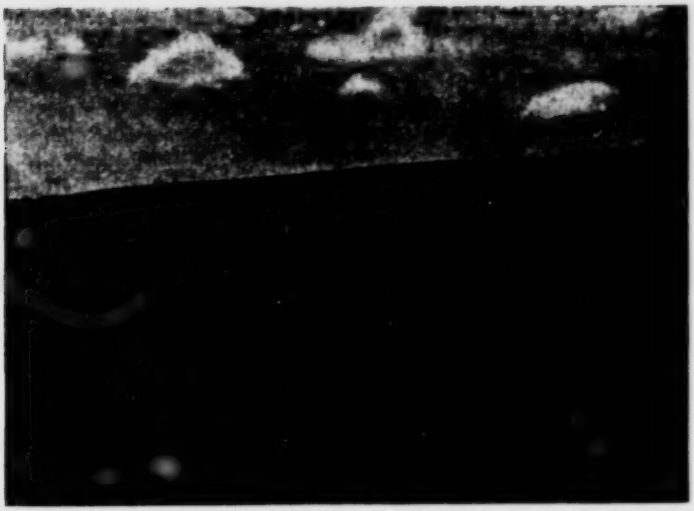

FIGURE 8. The Cumberland and Herbert soils, developed from water-deposited materials, occupy the floors of the larger river valleys.

FIGURE 9. Vegetable crops on Cumberland soil.

mottling. Small areas of the Bridgeville soils are covered with a mixed stand of black spruce, red spruce, red maple, poplar and alder. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| Aa | 0- 8 | Dark-brown (7.5 YR 4/2) silt loam; fine crumb structure; friable; pH 4.2. |
| Cg | 8-22 | Brown (7.5 YR 5/4) loam to fine sandy loam; mottled with distinct, light-brown and dark-gray patches in the upper part; moderately firm; friable; pH 5.2. |
| | 22+ | Gray sand and gravel. |

The profile varies in thickness and color, which is less bright than in the associated Cumberland soils and ranges from dull reddish brown to grayish brown. The prominence of mottling varies with drainage conditions.

*Use*

Bridgeville soils occur on small areas scattered throughout the Cumberland soils. Frequently they lie nearer the upland than the Cumberland soils and receive the drainage off the slopes. They have about the same value for crops as the Cumberland soils and, in dry years, may give better yields because of the slower movement of moisture. In many cases, simple drainage operations such as a suitably located ditch will improve the drainage of these soils and they may be cultivated along with the Cumberland soil areas. At present the Bridgeville soils are used chiefly for hay and pasture.

### Soils Developed from Moderately Coarse Textured Parent Materials

The soils developed on this type of parent material occupy about 38 per cent of Cape Breton Island and comprise the largest group of soils, except for miscellaneous land types. About 77 per cent of these soils are well drained and comprise the Westbrook, Pugwash, Shulie, Thom and Gibraltar series. The imperfectly drained Debert, Springhill, Mira and Bayswater series make up about 16 per cent of the soils. The remainder are the poorly drained Masstown, Economy, Arichat and Aspotogan series.

The soils in this group have level to mountainous topography and considerable variation in stoniness. Only 10 per cent of the land occupied by these soils is suitable for agriculture if moderate limitations are accepted. An additional 8 per cent can be used with severe limitations and the remainder is best suited to rough pasture or forest.

#### Westbrook Series (123,658 acres)

The Westbrook soils occupy nearly 5 per cent of the surveyed area. The larger areas are in Inverness, Cape Breton and Victoria counties and smaller ones in Richmond County. Some of the smoother land is in the Westmount district of Cape Breton County. Other large areas occur on Campbell Mountain, around Whycocomagh and Mabou in Inverness County and in the Baddeck and Middle River valleys and around Grand Narrows in Victoria County.

The parent material of the Westbrook soils is a reddish-brown, gravelly sandy loam glacial till derived principally from the underlying conglomerate. This conglomerate varies in texture from fine gravelly material to coarse, cobbly or stony fragments, so that the parent material varies in gravel and stone content and in water-holding capacity. The topography ranges from undulating to hilly and 92 per cent of the Westbrook soils have slopes greater than 8 per cent. Some of the areas are strongly dissected by streams. Many have a stony surface that interferes with tillage, and in some the underlying rock outcrops at the surface. Large areas are under forest consisting of balsam fir, red spruce, white spruce, sugar maple, beech, hemlock and yellow birch. A profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 2 - 1½ | Leaf litter, needles. |
| F | 1½- ½ | Grayish-brown, semidecomposed organic matter. |
| H | ½- 0 | Black, greasy mor; pH 3.9. |
| Ae | 0 - 1 | Light reddish brown (5 YR 6/3) loam; very friable; structureless; patchy; numerous roots; a few stones; pH 4.1. |
| Bfh | 1 - 5 | Yellowish-red (5 YR 4/6) loam; weak, medium crumb structure; friable; few stones; pH 4.7. |

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| $Bf_1$ | 5 -18 | Reddish-brown (5 YR 4/4) loam; structureless; friable; moderately firm; gravelly; pH 4.8. |
| $Bf_2$ | 18 -26 | Reddish-brown (5 YR 4/3) gravelly sandy loam; firm; structureless; friable; pH 4.9. |
| C | 26+ | Dark reddish brown (2.5 YR 3/4) gravelly sandy loam; firm; some stones; pH 5.1. |

The parent material may range from dark reddish brown to weak red. It is usually compact, especially on the slopes of the hills. Water tends to run down the slopes over the top of this compact subsoil, as it does in the Millbrook soils. The upper part of the profile is very permeable. In a few places the solum may be a sandy loam. Tree roots reach well down into the B horizon, which contains a fair amount of organic matter. The cultivated Westbrook soils have a very dark brown surface.

*Use*

On about 90 percent of the Westbrook soils the topography and stoniness seriously limit or discourage the growing of crops. Most of these areas are now in forest, which is the most suitable use of this land, since trees grow well on it. Areas shown as C-1 or C-2 on the soil map may be suitable for pasture or grazing (Figure 17). There are areas (B-1, B-2) suitable for crop production if simple precautions are taken to prevent erosion. Hay, grain and vegetables are being grown on these areas now. Lime and fertilizer and a good supply of organic matter are necessary for good crop yields.

### Pugwash Series (816 acres)

The Pugwash soils occur in the surveyed area only on Cheticamp Island and near Cheticamp in Inverness County. There are large areas in other parts of the province, where they are generally used for agriculture.

The parent material of these soils is a reddish-brown sandy loam till derived from local sandstone. It is very permeable to water, but in some areas the Pugwash till is underlain by a finer-textured till that prevents rapid movement of moisture through the soil. The topography ranges from level to undulating and usually there is not enough stone to interfere with cultivation. One area of this series lies along the shoreline and is being rapidly eroded by wave cutting and slipping. There are a few small stands of forest on the Pugwash soils. The principal trees are balsam fir, red spruce, red maple, wire birch and poplar. A profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black leaf litter and semidecomposed organic matter; very fibrous; pH 4.0. |
| Ae | 0- 4 | Pinkish-gray (2.5 YR 7/2) sandy loam; very friable; structureless; small stones; pH 4.5. |
| Bfh | 4-10 | Yellowish-red (5 YR 4/6) sandy loam; fine granular structure; friable; sandstone pebbles; pH 5.2. |
| Bf | 10-18 | Reddish-brown (2.5 YR 4/4) sandy loam; firm; friable; medium granular structure; sandstone fragments; pH 5.5. |
| C | 18+ | Weak-red (10 R 4/3) sandy loam; firm; some sandstone slabs; pH 5.5. |

The lower B horizon may be very weakly cemented and breaks out in small subangular blocks, about 5 to 10 millimeters in diameter, which are easily crushed between the fingers. The C horizon is firm, sometimes compact when dry, but seems to be moderately permeable. The cultivated soil is a light-brown sandy loam.

*Use*

Practically all of the Pugwash soils in Cape Breton are suitable for crop production. They are easily worked and moderately free from stone. Only their small acreage makes them of little importance in the agriculture of the Island. They are now used chiefly for hay and pasture.

These soils are well suited to the production of vegetables and market garden crops. The chief problem is the maintenance of fertility and organic matter. Liming is necessary for any type of crop production. Left for long periods, hay fields become weedy and the pastures have low carrying capacity, but this can be corrected with fertilization. Organic matter tends to be lost rapidly from the Pugwash soils. It should be maintained either by manuring or plowing down cover crops. A short rotation that will permit liming, fertilization and maintenance of organic matter should produce yields equal to those on any soil in the surveyed area.

### Shulie Series (142,873 acres)

Shulie series occupies more than 5 per cent of the Island, more than any other except the Thom series. Most of the soils occur in Cape Breton County, but there are substantial acreages in Inverness and Victoria counties. The larger areas are between Sydney and Mira River and around Glace Bay. Other fairly large acreages are between Southwest Margaree and Margaree Harbour near Port Hood, and on Boulardarie Island.

The topography ranges from gently undulating to hilly. About 35 per cent of the soils have slopes ranging from 1 to 8 per cent and the remainder are steeply sloping. Stoniness varies with depth of the till over bedrock. In general, the more steeply sloping land is the stoniest. The soils have good surface drainage and moderately rapid internal drainage.

The parent material of these soils is a grayish-brown sandy loam till of variable thickness. There are some areas that are very shallow over the sandstone bedrock. The tree cover is balsam fir, yellow birch, sugar maple, beech and spruce.

A typical profile (Figure 10) is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Dark-brown, semidecomposed organic matter; felty and fibrous; pH 3.5. |
| Ae | 0- 3 | Light-gray (10 YR 7/2) sandy loam; loose; porous; structureless; numerous roots; a few stones; pH 4.4. |
| $Bfh_1$ | 3-10 | Yellowish-brown (10 YR 5/6) loam; fine crumb structure; friable; porous; some roots; some stones; pH 4.5. |
| $Bfh_2$ | 10-16 | Yellowish-brown (10 YR 5/4) loam; fine crumb structure; friable; some stones; pH 5.1. |
| Bf | 16-22 | Light-olive (2.5 Y 5/4) sandy loam; slightly firm; structureless; porous; fragments of gray sandstone; pH 5.0. |
| C | 22+ | Dark grayish brown (10 YR 4/2) sandy loam; moderately firm to compact; brittle; numerous angular sandstone fragments; pH 4.7. |

The cultivated soil is a light-brown sandy loam. Some of the soils have a reddish cast and the upper B horizon may be yellowish red. The parent material is then a dull reddish brown and the soils resemble the Folly series in Colchester County. Tree roots go well down into the B horizon in this porous soil. There are a few areas where the B horizon may be sandier than that described above.

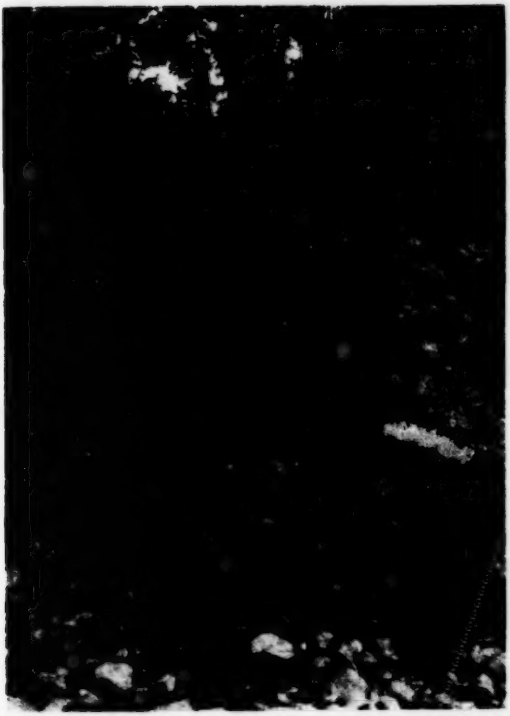

FIGURE 10. A profile of a Shulie soil. These soils tend to be stony and shallow in most places.

FIGURE 11. Where the till is deep, the Shulie soils have smooth topography and are suitable for agriculture.

*Use*

About 31 per cent of the Shulie soils have topography and freedom from stones that make them favorable for cultivation with easily applied practices and simple water-management operations (Figure 11). Nearly all of this type of land, except about 1,100 acres in Inverness County, lies near Sydney, which is a large market for agricultural produce. Some of this land is used for vegetable growing, but most is in hay or pasture. Much of this land could be more productive. Another 15 per cent has steeper slopes but is not very stony and would be suitable for hay, grain or pasture (Figure 12). Some precautions are necessary to prevent erosion when hoed crops are grown on this land.

The rest of the Shulie soils are best suited to forest and trees grow well on these areas. The less stony tracts could be used for permanent pasture. Shulie soils are very acid. They are also very porous and the maintenance of organic matter is a problem. Lime and fertilizers are necessary for successful production.

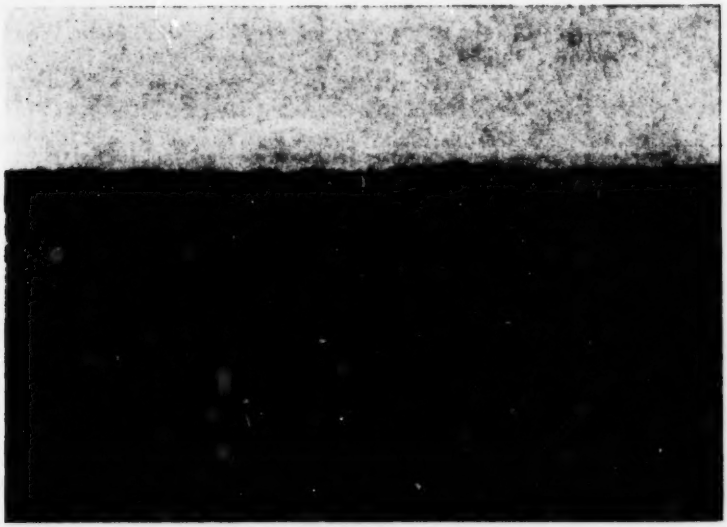

FIGURE 12. The more rolling or hilly areas of Shulie soils are usually suitable only for pasture or forest.

### THOM SERIES (495,815 acres)

The Thom series occupies nearly 19 per cent of the Island, more than any other soil type. These soils are found in all four counties, but mainly in Cape Breton and Inverness counties.

The parent material of these soils is a grayish-brown sandy loam till derived largely from metamorphosed sedimentary rocks. It is rather porous and occasionally very stony. The till varies in depth from a few inches to several feet and the bedrock outcrops in some places.

In general, the topography is hilly or even mountainous. Smoother areas occur on the tops of the hills and in a few other locations, but about 90 per cent of the land has slopes greater than 8 per cent. Large areas of the Thom soils are very stony and only about 3 per cent of them are sufficiently free from stone to permit cultivation (Figure 13).

The cleared slopes have fairly rapid runoff, but there are places where seepage spots occur on the hillsides due to the dip of the underlying rock.

FIGURE 13. When Thom soils are cultivated in heavily forested areas, it is often necessary to protect gardens from deer.

Internal drainage is usually moderately rapid in these soils. Trees grow well, principally spruce, balsam fir, sugar maple, red maple, beech, yellow birch, white birch and hemlock. A profile on the deeper type of parent material is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Dark reddish brown (5 YR 2/2), partly decomposed organic matter; fibrous and felty mor; pH 3.6. |
| Ae | 0- 2 | Light reddish brown (5 YR 6/2) sandy loam; fine crumb structure; porous; friable; numerous roots; pH 3.9. |
| $Bfh_1$ | 2-12 | Strong-brown (7.5 YR 5/6) sandy loam; fine crumb structure; numerous roots; some stones; friable; pH 5.1. |
| $Bfh_2$ | 12-20 | Dark-brown (7.5 YR 4/3) sandy loam; structureless; gravelly; slightly firm; very stony; pH 5.2. |
| C | 20+ | Dark-brown (10 YR 4/3) gravelly sandy loam; firm; very stony; pH 5.4. |

A dark-colored B horizon is characteristic of the Thom soils and indicates movement and accumulation of organic matter in the horizon. In some places the upper B horizon is thin and the lower B is yellowish brown, grading to olive gray in the parent material. The L-H horizon is often only one inch thick. On some of the steeper slopes the parent material has a reddish cast and has probably been mixed with other material. In a few locations the B horizon is a silt loam where finer material has been mixed with the till. The stones are sharply angular metamorphic rocks one to three inches in size. Where moisture accumulates, the B horizon is grayish brown with darker-brown patches, and the soil grades into the imperfectly drained Mira series.

*Use*

Only very small areas of the Thom soils are cultivated. Most areas have topography and stoniness that make cultivation impractical. In spite of this, several large areas have been cleared, but most have been abandoned and are reverting to forest. Some areas with suitable topography have been used for

pasture (Figures 14 and 15). The largest area to be used in this manner is on the top of Mabou Mountain in Inverness County, where a community pasture has been established. There are a few other areas, now under forest, that have similar topography and stoniness but are too small to be used in this way.

FIGURE 14. A typical farm on a Thom soil.

FIGURE 15. The Thom soils occupy the largest area of soils of Cape Breton Island. They are moderately coarse textured and support an excellent forest growth. Some of the more favorable areas are cleared and farmed, or are used for pasture.

The Thom soils are low in natural fertility and evidently deteriorate rapidly under cultivation, largely due to loss of organic matter. Liming, fertilization and maintenance of organic matter are required for successful crop

production. These soils erode easily and precautions should be taken to retard rapid runoff on slopes that are suitable for cropping. Most of the land is best suited to forest, as tree roots penetrate the soil readily. Excellent stands of timber have been observed on these soils (Figure 15).

### Gibraltar Series (26,681 acres)

The soils in this series occur in only two counties of the Island, but they are widespread in other parts of the province. In Victoria County they are found near Ingonish, Birch Plain and Wreck Cove. In Richmond County they are found along the coast around Lower St. Esprit and Framboise Intervale. They occupy about 1 per cent of the surveyed area.

The parent material of these soils is a pale-yellow to pale-brown sandy loam till that contains a large amount of granitic material. It is very porous and often contains numerous granite cobbles and boulders. In general, the soils have moderately rapid to rapid drainage due to the porous nature of the parent material. The topography ranges from undulating to rolling. Stoniness is usually the limiting factor in land use; nearly 90 per cent of the soils in the surveyed area are very stony or bouldery. The tree cover is balsam fir, wire birch, red maple, sugar maple, hemlock, poplar, white pine, and occasionally oak. A typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 3- 0 | Black, semidecomposed organic matter; fibrous mor. |
| Ae | 0- 4 | Pinkish-gray (7.5 YR 7/2) sandy loam; granular structure; friable; pH 3.8. |
| $Bfh_1$ | 4- 6 | Dark reddish brown (5 YR 3/3) sandy loam; granular structure; very weakly cemented; pH 4.5. |
| $Bfh_2$ | 6-12 | Strong-brown (7.5 YR 5/6) sandy loam; medium granular structure; moderately firm; very weakly cemented; pH 4.8. |
| Bf | 12-24 | Yellowish-brown (10 YR 5/6) gravelly sandy loam; firm; granite cobbles; pH 5.3. |
| C | 24+ | Pale-brown (10 YR 6/3) gravelly sandy loam; firm; numerous stones; pH 5.5. |

The color and consistence of the upper B horizon vary considerably. Where the soils occur on exposed positions near the coast, the B horizon tends to be darker in color and weakly to strongly cemented with iron and organic matter. On the inland sites there is usually very little cementing and the B horizon is a strong-brown to dark-brown color, with a friable consistence.

*Use*

The Gibraltar soils are not used to any extent for agriculture, because of the difficulty of clearing the stone from the surface. There are a few areas in Victoria County, about 2,500 acres in all, that are only moderately stony and might be used for agriculture. Where these soils can be cultivated, lime and fertilizer are required to produce economical yields. The open, porous nature of the soils tends to make them droughty unless organic matter is maintained. Mostly, these soils are best suited to forest.

### Debert Series (26,639 acres)

The Debert soils occur in all counties of the Island and have their largest area in Cape Breton and Victoria counties. They cover about 1 percent of the surveyed area. Where drainage is somewhat restricted, they are associated with the Westbrook and Pugwash soils.

The parent material is a reddish-brown sandy loam to gravelly loam till that is very firm to compact. The topography ranges from undulating to gently rolling and only about one third of the soils are too stony for cultivated crops. Drainage is restricted by the firm subsoil and moderately slow internal drainage.

The forested areas have balsam fir, red maple, red spruce, wire birch and poplar. A profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black (5 YR 2/1), semidecomposed organic matter; fibrous and felty; pH 3.8. |
| Ae | 0- 2 | Reddish-brown (5 YR 5/3) silt loam; weak, medium platy structure; slightly firm; very faint brown mottles; pH 4.2. |
| Bfg | 2- 7 | Reddish-brown (5 YR 4/3) sandy loam; weak, medium subangular blocky structure; moderately firm; distinct, brown mottles; pH 4.6. |
| Bg | 7-14 | Reddish-brown (2.5 YR 5/4) loam; very firm; structureless; strongly mottled; some stones; pH 5.0. |
| C | 14+ | Dark reddish brown (2.5 YR 3/4) loam; structureless; compact; numerous stones; pH 5.2. |

The parent material is dark reddish brown to weak red. The B horizon is usually reddish brown but may be yellowish red, and in some places it is difficult to distinguish an upper and lower B horizon. Mottling is present throughout the B and C horizons. Where the parent material is very sandy, there is frequently a thin horizon, one quarter to one inch thick and pale reddish brown, in color, that grades into the underlying reddish-brown B horizon. This layer seems to be more mottled than the rest of the profile and it may be weakly cemented with organic matter.

*Use*

Only a very small part of the Debert soils is under cultivation. Adequate drainage is the principal problem. About 27 per cent of the soils are too stony for anything except rough pasture or forest. The remainder have favorable topography, are moderately free from stone and would be suitable for hay, grain or pasture, and possibly hoed crops if drainage could be established. Natural fertility is low and lime and fertilizers are required before good yields are obtained. Areas now used for pasture could be improved with liming and fertilization. The stonier soils are best suited to forest.

### Springhill Series (83,169 acres)

About 3 per cent of the Island is occupied by the Springhill soils. They occur in all counties except Richmond. Large areas occur on both sides of the highway between Sydney and Albert Bridge and between Sydney and Glace Bay. Smaller areas are scattered throughout Inverness and Victoria counties. These soils occupy the imperfectly drained sites associated with the Shulie soils where water movement has been restricted by the topography and the parent material.

The parent material is a sandy loam till similar to that of the Shulie soils. The topography ranges from undulating to gently rolling and includes long slopes where seepage occurs. Surface stoniness varies over small areas and ranges from slight to excessive.

Large areas of the Springhill soils are covered with forest of black spruce, white spruce, balsam fir and red maple. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, semidecomposed organic matter; greasy mor; pH 3.8. |
| Ae | 0- 6 | Light-gray (10 YR 7/2) sandy loam; friable; granular structure; sandstone fragments; pH 4.2. |
| Bfg | 6-12 | Strong-brown (7.5 YR 5/6) sandy loam; moderately firm; prominent, diffuse, brown mottles; pH 4.4. |
| Bg | 12-26 | Brownish-yellow (10 YR 6/6) sandy loam; granular structure; weakly cemented; firm; mottled; pH 4.5. |
| C | 26+ | Light yellowish brown (2.5 YR 6/4) sandy loam; firm to compact; faint mottling; pH 5.0. |

The cultivated Springhill soils have a dark-brown sandy loam surface. In some places the lower horizons have a reddish-brown cast where the parent materials have been mixed with till from other sources. Some cementing in the lower B horizon was observed, but this is not common. Sandstone slabs and cobbles occur throughout the profile.

*Use*

Although about 70 per cent of the Springhill soils are suitable for agricultural use, only very small areas have been cultivated. Most of these have been included in the cultivation of the Shulie soils. The Springhill soils are suitable for most crops grown on the Island if precautions are taken to ensure adequate drainage and to control erosion. Lime and fertilizer must be used for good yields. In many cases the land is not used because of its location or because suitable sites are small and scattered among very stony areas. Such areas may be suitable for pasture. In general, unless conditions warrant clearing the land for crops, these soils are best suited to forest.

### Mira Series (49,023 acres)

The Mira soils occupy about 2 per cent of the surveyed area. They are found on imperfectly drained sites associated with the Thom soils. They have their greatest extent in Cape Breton County, along the coast from the Richmond County line to Louisburg. The parent materials are similar to those of the Thom soils, but the topography, the dip of the underlying bedrock, or seepage on the steep slopes restricts the movement of water to some extent. Profile development and mottling reflect this. Most areas of the Mira soils are very stony, some being extremely stony or shallow.

The topography ranges from long slopes to nearly level land. Most of the land is level to undulating. Tree cover is balsam fir, red spruce, red maple, poplar and some hemlock. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Very dark grayish brown (10 YR 3/2), semidecomposed organic matter; greasy mor; pH 3.8. |
| Ae | 0- 2 | Pinkish-gray (7.5 YR 6/2) sandy loam; fine crumb structure; very friable; pH 4.3. |
| Bfg | 2- 9 | Dark-brown (10 YR 4/3) loam; weak, medium crumb structure; friable; diffusely mottled; pH 4.6. |
| Bg | 9-22 | Dark yellowish brown (10 YR 4/4) sandy loam; firm; distinctly mottled; stony; pH 5.0 |
| C | 22+ | Brown (10 YR 5/3) sandy loam; firm to compact; slightly mottled; stony; pH 5.2. |

The Bfg horizon ranges from dark brown to dark grayish brown, depending on the drainage. The brown color is carried down deep into the profile and is diffusely mottled with lighter-brown patches, moisture tends to move laterally along the top of the compact C horizon, which it penetrates very slowly.

*Use*

Very small areas of the Mira soils are under cultivation. This is due partly to their location in unsettled areas and partly to their stoniness. Where the soils are suitable for cultivation, they have about the same value and require the same management practices as the Thom soils. Less than 10 per cent of the Mira soils are suitable for agricultural use. They are best suited for forest at present.

### Bayswater Series (6,528 acres)

The Bayswater soils have a limited extent in the surveyed area. They occur chiefly in the northern part of Victoria County around Cape North and North Ingonish, and a small area is found in Richmond County. These soils are associated with the Gibraltar soils and are developed from similar granitic materials. The drainage ranges from moderately good to imperfect and is somewhat restricted by the topography. The topography ranges from undulating to steep slopes on which seepage occurs, and there are many areas where the parent material is thin over the bedrock. More than half of these soils are very or extremely stony and, though the topography might be favorable for agricultural use, the clearing of stones would be impractical. Most areas are now covered with forest, largely black spruce, hemlock, red maple, wire birch and occasionally pine. A typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 4- 3 | Leaf litter, needles. |
| F | 3- 1 | Black, semidecomposed organic material; fibrous. |
| H | 1- 0 | Black, fairly well decomposed organic matter; greasy mor; pH 3.8. |
| Ae | 0- 4 | Pinkish-gray (7.5 YR 6/2), coarse sandy loam; medium granular structure; friable; some roots; pH 4.2. |
| Bfhg | 4-10 | Dark reddish brown (2.5 YR 3/4), coarse sandy loam; moderately firm; very weakly cemented; mottled with lighter-colored patches; pH 4.5. |
| $Bfg_1$ | 10-18 | Strong-brown (7.5 YR 5/6) sandy loam; very firm; mottled; pH 5.0. |
| $Bfg_2$ | 18-26 | Yellowish-brown (10 YR 5/4) sandy loam; firm; stony; mottled; pH 5.2. |
| C | 26+ | Pale-brown (10 YR 6/3) sandy loam; firm; diffusely mottled; pH 5.2. |

In some locations the dark-colored upper B horizon is very thin or is brown and grades into yellowish brown in the lower B horizon. There is some cementing in the upper B horizon, but this is not common. Usually, the dark colors are carried well down into the profile and show lighter-colored, diffuse mottling throughout.

*Use*

A few areas of the Bayswater soils have been used, along with the well-drained Gibraltar soils, for hay and pasture or for local garden crops. These areas are not extensive and most of the series is in forest.

### Masstown Series (2,506 acres)

The Masstown soils are associated with the Debert and Pugwash soils, occupying the poorly drained sites on the landscape. The Masstown soils have only a limited extent in the surveyed area and are not agriculturally important. They are developed from a reddish-brown sandy loam parent material similar to that of the Debert and Pugwash soils. The till is frequently thin over the bedrock or is compact, so that drainage is restricted. In many cases the drainage is slowed by the topography, which ranges from undulating to depressional. In some places these soils are found on long slopes where seepage water accumulates. The soils are moderately stony. Drainage is the principal limitation to use for crops.

The tree cover includes black spruce, red maple, tamarack and alder. A typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 4- 0 | Black, semidecomposed organic matter; greasy mor; pH 4.0. |
| Aeg | 0- 4 | Gray (5 YR 5/1) sandy loam; medium granular structure; very friable; diffuse dark mottling; pH 4.5. |
| Bg | 4-12 | Yellowish-red (5 YR 5/8) sandy loam; medium granular structure; firm; prominently mottled; pH 5.2. |
| C | 12+ | Red (2.5 YR 4/6) sandy loam; firm to compact; faint yellowish-brown mottles; pH 5.5. |

The parent material may range from reddish brown (5 YR 4/3) to weak red (10 R 4/3), and the Bg horizon may range from reddish brown to red. In a few locations there may be a thin Ah horizon beneath the leaf litter, but this is not common. There is a wide variation in the degree of mottling, but usually it is prominent and has strong contrast. In the very poorly drained sites, the Aeg and Bg horizons may be dull gray and vary little in color except for the prominent mottling throughout. The Aeg horizon is usually rather thick and has dark-colored humic stains mottling the horizon. The lower B and C horizons may be slightly plastic.

*Use*

The Masstown soils are moderately well suited to the use of farm machinery, but their location and poor drainage have discouraged their use. Some areas are suitable for pasture, but most are best used for forest.

### Economy Series (33,182 acres)

The Economy soils are found on poorly drained sites associated with the Shulie soils. The larger areas are in Cape Breton County to the east of Sydney. Other areas occur in the other three counties. These soils cover slightly more than 1 per cent of the Island area.

The parent material is a sandy loam till similar to that of the Shulie soils. In some locations this is underlain, at depths ranging from a few inches to several feet, by a reddish-brown, plastic till. The parent material is usually very stony, consisting of small slabs and cobbles of sandstone, and is very firm to compact.

The topography ranges from very gently undulating to depressional and surface drainage is very slow. Water saturates the soil most of the year and topography makes drainage difficult. Large areas are covered with forest com-

posed of black spruce, red maple, tamarack and alder. A profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 3 - 2 | Leaf litter, moss. |
| F | 2 - ½ | Black, semidecomposed leaf litter and moss. |
| H | ½- 0 | Black, greasy mor; pH 3.8. |
| Aeg | 0 - 6 | Light-gray (10 YR 7/2) sandy loam; moderately firm; prominently mottled; pH 4.0. |
| Bg | 6 -16 | Strong-brown (7.5 YR 5/8) sandy loam; prominently mottled with gray and brown patches; firm; stony; pH 4.6. |
| C | 16+ | Dark grayish brown (2.5 Y 4/2) sandy loam; firm to compact; stony; pH 5.2. |

In many places the C horizon has a reddish cast where the till has been mixed with some of the underlying material. Then the Bg horizon may have a light reddish brown color with yellowish-brown and gray mottling. Small areas of this variant were included with the Economy series.

*Use*

Though most of the Economy soils on Cape Breton Island are suitable for use of farm machinery, their persistent wetness has discouraged their use for agriculture. They are difficult to drain and it is not likely that they will be used for agriculture unless the demand for additional farm land becomes acute. Some of the better-drained areas are suitable for pasture, but fertility must be improved to maintain the carrying capacity. In general, the soils are best suited to forest.

### Arichat Series (32,930 acres)

The Arichat soils occupy slightly more than 1 per cent of the Island. They occur in Cape Breton and Richmond counties and in mainland parts of the province. They are associated with the Thom and Mira soils. The Arichat soils occupy poorly drained sites on a very gently undulating to depressional topography.

The soils are developed from material similar to that of the Thom soils, but water movement is restricted by the topography, the underlying bedrock or compactness of the till itself. Most of these soils are very stony, but a few areas have a moderate amount of stone. Tree cover consists of balsam fir, black spruce, red maple, tamarack and alder.

The usual appearance of the profile is as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 3 - 2 | Leaf litter, needles, moss. |
| F | 2 - ½ | Black, semidecomposed leaf litter and moss; fibrous. |
| H | ½- 0 | Black, greasy mor; fibrous; pH 3.7. |
| Aeg | 0- 6 | Light brownish gray (10 YR 6/2) sandy loam; faintly mottled; moderately firm; stony; pH 4.0. |
| $Bg_1$ | 6-10 | Brown (7.5 YR 5/4) sandy loam; very firm; strongly mottled with yellowish brown and gray; stony; pH 4.5. |
| $Bg_2$ | 10-20 | Brown (10 YR 5/3) sandy loam; firm; moderately mottled; stony; pH 4.8. |
| C | 20+ | Yellowish-brown (10 YR 5/4) sandy loam; compact; stony; some mottling; pH 5.0. |

Many profiles are shallower than the one described, and bedrock may occur at 12 to 14 inches below the surface. In these shallow profiles the brown color of the B horizon is carried down to the parent material. In

a few locations the C horizon may have a reddish cast because of mixing with other till. The B horizon usually has a firm consistence and moisture movement is slow through this horizon.

*Use*

Practically none of the Arichat soils are used for crops because of their location, poor drainage and stoniness. A few small areas are suitable for permanent pasture, but most of the soils are best suited to forest.

### Aspotogan Series (1,605 acres)

Although Aspotogan soils are rare on Cape Breton Island, they are widespread on the mainland, particularly along the southern coast of the province. These soils occur on the poorly drained sites associated with the Gibraltar and Bayswater soils and are developed from similar materials.

The topography ranges from very gently undulating to depressional and most of the areas mapped are extremely stony. Frequently these stones weigh several tons. The soils are saturated with water most of the year. Water movement is restricted by the topography, the underlying bedrock and the firm parent material. The forested areas have red maple, black spruce, tamarack, alder and an undergrowth of labrador tea and sphagnum moss. A profile under forest appears as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 6 - 3 | Moss, leaf litter, twigs. |
| F | 3 - ½ | Black, semidecomposed litter; fibrous and felty; numerous roots. |
| H | ½- 0 | Black, greasy mor; numerous roots. |
| Aeg | 0- 6 | Gray (10 YR 6/1) sandy loam; weak platy structure; moderately firm; mottled with distinct, grayish-brown patches; pH 4.2. |
| $Bg_1$ | 6-14 | Very dark grayish brown (10 YR 3/2) sandy loam; granular structure; moderately firm; prominently mottled with yellowish brown and gray; pH 4.8. |
| $Bg_2$ | 14-24 | Yellowish-brown (10 YR 5/6), coarse sandy loam; very firm; mottled; pH 5.0. |
| C | 24+ | Light brownish gray 2.5 Y 6/2), coarse sandy loam; very firm; moderately mottled; pH 5.2. |

The mottling of the solum varies considerably, depending on drainage conditions, but usually there is a strong contrast in the colors. The B horizon ranges from dark brown to yellowish brown. In certain locations the upper part of the B horizon is very weakly cemented, but this is not common. The profile is stony throughout and frequently boulders are present, particularly where the soil is shallow.

*Use*

The Aspotogan soils are too stony and wet for crop prdouction and have limited use other than forestry. Usually, less stony areas are too small to be useful for rough pasture.

## Soils Developed from Coarse-textured Parent Materials

These soils are largely derived from coarse-textured materials deposited by water. They occupy about 2.9 per cent of the surveyed area and are found chiefly along the larger stream courses and river valleys. About 87 per cent of the soils are in the well-drained Canning, Hebert, Torbrook and

Digby series. About 3 per cent are in the imperfectly drained Kingsport and Comeau series. The rest of the soils are in the poorly drained Meteghan and Millar series.

These soils occur on a variety of land forms such as kames, eskers and outwash plains deposited by glacial melt water, and on flood plains deposited by rivers. The main problem on them is drainage, which ranges from poor to excessive. On the well-drained materials, droughtiness is frequently the limiting factor in agricultural use.

### Canning Series (9,789 acres)

The soils of the Canning series were mapped only in Inverness County, where they occur southeast and north of Inverness town, and around Margaree Forks. They occupy less than 0.5 per cent of the surveyed area. They are associated with the Hebert, Kingsport and Millar soils, mainly along the sides of old river valleys. The Canning soils are developed from reddish, water-deposited sands and are free from stone, except where erratic stones were left on the surface by the glacial ice. Occasionally, lenses of finer material occur in the sands.

The topography ranges from level to rolling and there is evidence that some of the material was moved by wind and deposited in dunes. Moisture percolates rapidly in these soils, and they tend to be droughty. The forest consists of spruce, balsam fir and wire birch. A typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 1- 0 | Dark grayish brown (10 YR 4/2), semidecomposed organic matter; loose; fibrous; greasy mor; pH 4.0. |
| Ae | 0- 5 | Pinkish-white (5 YR 8/2) loamy sand; very friable; structureless; numerous roots; pH 4.5. |
| Bfh | 5-16 | Yellowish-red (5 YR 5/8) loamy sand to sandy loam; slightly firm; friable; granular structure; pH 4.8. |
| Bf | 16-23 | Yellowish-red (5 YR 5/6) sandy loam; moderately firm; some gravel; pH 4.8. |
| C | 23+ | Weak-red (10 R 4/4) sandy loam; firm; thin lenses of fine sand; pH 5.0. |

The Canning soils differ from other water-deposited soils in having a distinctive red color throughout the profile. In a few places, the upper part of the B horizon becomes yellowish brown and the solum is browner, particularly where the soils lie near the Hebert soils, although the underlying material is reddish brown to red. The cultivated soil is a reddish-brown sandy loam.

*Use*

The agricultural use of the Canning soils is limited chiefly by their low moisture-holding capacity. About 60 per cent of the soils have slopes that are unfavorable for crops other than pasture. Any crop production program on these soils requires building up the organic matter content to increase the moisture-holding capacity, irrigation or both. In a few places, moisture conditions may be better than average because water movement is slowed by lenses of finer-textured material in the lower part of the profile. Hay and pasture crops usually suffer from lack of moisture and give low yields. On the more gentle slopes with few or no stones (A-0, B-0, B-1 on map), these soils are suitable for vegetables and small fruits or orchards if the organic matter and fertility are built up. Generally, such soils would require irrigation for best results. The steeper slopes are best suited to forest.

### Hebert Series (49,047 acres)

Nearly 2 per cent of the surveyed area is occupied by the Hebert soils. They occur along the river valleys in all of the counties. The larger areas are around Northeast Margaree, Pleasant Bay, Briton Cove, Skir Dhu and along the Aspy River valley.

The parent material is a coarse-textured, stratified sand and gravel deposit of glacial streams. The material ranges from fine sand and fine gravel to coarse, bouldery gravel. On most areas the topography ranges from level to undulating, but there are places where the gravel is coarser or has been deposited over rougher terrain, and rolling to hummocky topography is common. Except for small areas, there is usually not enough stone on the surface to discourage clearing and cultivation. However, the soils tend to be droughty and this limits their use.

Only small areas are forested. Tree cover consists of spruce, balsam fir, white pine, red pine and wire birch. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 2 - 1 | Leaf litter, twigs, needles. |
| F | 1 - ½ | Black, semidecomposed organic material; fibrous; |
| H | ½- 0 | Black, greasy mor; numerous roots; fibrous; pH 4.1. |
| Ae | 0 - 4 | Pinkish-gray (7.5 YR 7/2) sandy loam; granular structure; friable to loose; numerous roots; pH 4.6. |
| Bfh | 4 -12 | Brown (7.5 YR 5/5), gravelly sandy loam; very friable; some gravel; pH 4.3. |
| Bf | 12 -22 | Brown (7.5 YR 4/4) sandy loam; firm; gravelly; pH 4.8. |
| C | 22+ | Dark grayish brown (10 YR 4/2), gravelly sandy loam; firm; porous; pH 4.9. |

There is considerable variation in the amount of gravel in the profile and, occasionally, small boulders are present. The texture of the upper part of the profile ranges from a loamy sand to sandy loam. The soils may have a reddish cast where they lie near the Canning soils. Along the sides of the valleys the parent materials may be very thick and the lower gravels may contain lenses of reddish-brown, fine-textured till. Along the coast in Victoria County the gravel deposits are coarse and cobbly, with some large stones in the profile and on the surface.

*Use*

About 60 per cent of the Hebert soils have topography favorable for easy cultivation, but low moisture-holding capacity is a serious limitation to use. Where there is finer material in the deposits reasonably near the surface, moisture conditions are better. In general, the growing of crops on these soils requires a good supply of organic matter and possibly irrigation. The soils are low in natural fertility. This can be corrected by liming and fertilization, which has been done in a few small areas and produced good yields of hay and grain. On these soils successful crop production depends on efficient management, the control of water relationships being one of the most important considerations.

The Hebert soils are much used for road building materials. Most of them are best suited to forest.

### Digby Series (1,410 acres)

The Digby soils occur only in Inverness County near Grand Etang. They are of small extent on Cape Breton Island, but are present in other parts of the province. The soils are developed from beach sands and gravels. The material

varies in thickness from about a foot to several feet and it is invariably underlain by fine-textured sediments, usually of marine origin. In some respects the Digby soils resemble the Hebert soils, but contain more fine material and have higher moisture-holding capacity.

The topography ranges from gently undulating to rolling and includes a few terraces that have steep slopes. Internal drainage is moderately rapid. There are occasional stones on the surface, and stone piles in some of the cleared fields show that the soils were originally very stony. The tree cover is spruce, balsam fir, red maple, birch, and some poplar. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 3- 0 | Black, semidecomposed organic matter; fibrous mor; numerous roots; pH 3.8. |
| Ae | 0- 2 | Pale-brown (10 YR 6/3) sandy loam; friable; some roots; pH 4.2. |
| Bfh | 2-10 | Brown (7.5 YR 5/4), gravelly sandy loam; weak crumb structure; friable; slightly firm; some cobbles; pH 5.4. |
| Bf | 10-16 | Yellowish-brown (10 YR 5/4), gravelly sandy loam; moderately firm; some cobbles; pH 5.4. |
| C | 16-32 | Grayish-brown (10 YR 5/2), gravelly sandy loam; very gravelly to cobbly; pH 5.4. |
| D | 32+ | Dark reddish brown (5 YR 3/4) clay loam till; very firm. |

The cultivated Digby soil is a very dark brown sandy loam to loam. In some locations the B horizon is strong brown in color. The composition of the D horizon varies in different parts of the province. In some cases, it is a grayish marine sediment and in others it is glacial till. The gravel in the various horizons ranges from fine pebbles to large cobbles.

*Use*

Although somewhat better than the Hebert soils, the Digby soils are limited in use by their low moisture-holding capacity. About half the soils are favorable for the use of farm machinery. Where the deposit is not too thick over the underlying D horizon, the moisture supply seems to be adequate for grain and hay crops and there is alfalfa on some of these soils. In general, however, moisture supply is inadequate during the summer months. Organic matter has to be built up and maintained to ensure profitable crop production. Liming and fertilization are also necessary. Fertility is lost rapidly because water percolates freely through the profile. The steeper and stonier areas should be left in forest.

### Torbrook Series (6,719 acres)

The soils of the Torbrook series occupy a very small part of the Island. They occur only in Cape Breton County, south of the Mira river.

The parent materials of these soils are poorly sorted, shaly gravels. Lenses of fine sand and very fine gravel are interspersed throughout the deposit and occasional slabs of sandstone are found in the gravel. The material ranges from a few feet to about 20 feet deep.

The topography is gently undulating or gently rolling and the open, porous nature of the material ensures rapid drainage. These soils have a slightly better moisture-holding capacity than the Hebert soils. There is usually not enough stone on the surface to interfere with cultivation, although occasional boulders

may be present. The Torbrook soils support a growth of red spruce, white spruce, wire birch, gray birch and some pine. The appearance of the profile is as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, semidecomposed organic matter; fibrous mor; numerous roots; pH 4.0. |
| Ae | 0- 3 | Pinkish-gray (7.5 YR 7/2) loam; fine, subangular blocky structure; very friable; pH 4.2. |
| Bfh | 3-12 | Strong-brown (7.5 YR 5/8) gravelly loam; fine, subangular blocky structure; friable; pH 4.5. |
| $Bf_1$ | 12-26 | Yellowish-brown (10 YR 5/8) gravelly loam; moderately firm; friable; pH 4.8. |
| $Bf_2$ | 26-36 | Yellowish-brown (10 YR 5/6) gravelly loam; moderately firm; considerable shaly gravel; pH 5.2. |
| C | 36+ | Dark grayish brown (2.5 Y 4/2) gravel; firm, weakly stratified; pH 5.2. |

The Ae horizon is usually thicker than described here and may be very irregular. The amount of gravel in the upper 15 inches of the profile is extremely variable from place to place with consequent differences in the texture of the upper part of the solum. Sand streaks are common at depths ranging from 3 to 8 feet. The cultivated soil is a brown loam.

*Use*

Torbrook soils are largely in forest and on the steeper slopes this is their best use. About 20 per cent of the soils are favorable for cropping and some of this area has been farmed. The principal crops are hay, grain, pasture and vegetables. Liming and fertilization are necessary for good yields. The tendency of the soils to be droughty requires that organic matter levels be maintained to aid moisture retention.

### Kingsport Series (1,000 acres)

The soils of the Kingsport series are of small extent. The largest area occurs in Inverness County on Big Harbor Island. These soils are associated with the Canning soils where drainage is impeded.

The parent material is similar to that of the Canning soils and may contain lenses, or varves, of finer material. It is usually underlain at one to three feet by clay. The topography is level to very gently undulating, a few areas having gently rolling relief. Water movement is slowed by the firmness of the subsoil and the underlying clay. Stoniness is not a problem. Tree cover is balsam fir, red spruce, red maple, tamarack and occasional pine. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 2 - 1½ | Leaf litter, moss, twigs. |
| F | 1½- ½ | Dark-gray, semidecomposed leaf litter, moss and roots; fibrous. |
| H | ½ - 0 | Black, greasy mor; numerous roots; pH 4.0. |
| Ae | 0 - 4 | Light-gray (10 YR 7/2) loamy sand; very friable; darkened with humus in the lower part; pH 4.2. |
| Bfh | 4 - 5 | Dark reddish brown (5 YR 3/2) loamy sand; moderately firm; weakly cemented; pH 4.8. |
| $Bfg_1$ | 5 -14 | Reddish-brown (5 YR 4/3) sandy loam; firm; structureless; weakly cemented; dark-brown mottles; pH 5.0. |
| $Bfg_2$ | 14 -24 | Dark-red (2.5 YR 3/6) sandy loam; firm; diffuse mottling; pH 5.2. |
| C | 24+ | Yellowish-red (5 YR 4/6) loamy sand; firm; diffuse mottling; pH 5.2. |

The lower horizons vary from yellowish red to dark red. Many profiles do not have the thin, weakly cemented Bfh horizon and the entire B horizon is reddish brown. It is usually weakly cemented and breaks out in moderately fine, subangular blockly aggregates. The C horizon may rest on a layer of reddish-brown clay six inches to a foot thick, which, in turn, may be underlain by coarse sand.

*Use*

The topography and nature of the soil are favorable for use of all types of farm machinery, but problems of drainage, fertility, location and profitability have discouraged the use of these soils. They are mostly covered with forest and this is their best use until the demand for crop land becomes acute.

### Comeau Series (1,207 acres)

The Comeau soils have about the same area as the Kingsport soils, but they occur in all counties except Richmond. They are associated with the Digby and Hebert soils on imperfectly drained sites.

The parent material of these soils is a water-deposited, gravelly sandy loam that varies considerably in the amount of fine material and in the size of gravel fragments. The topography is level to gently undulating, sometimes having a low, mounded appearance. A few areas are very stony, but generally there is not enough stone on the surface to interfere with cultivation. The movement of moisture is restricted by the firmness of the subsoil and sometimes by the topography. Tree cover includes black spruce, red spruce, tamarack, red maple, and balsam fir. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 2- 0 | Black, semidecomposed organic matter; H layer fibrous mor; pH 3.8. |
| Ae | 0- 2 | Light-gray (10 YR 6/1) sandy loam; friable; some fine gravel; pH 4.2. |
| Bfhg | 2-10 | Brown (10 YR 5/3) gravelly sandy loam; firm; prominent dark-brown mottles; pH 4.8. |
| Bfg | 10-20 | Grayish-brown (10 YR 5/2), gravelly sandy loam; firm; weakly cemented; dark-brown mottles; pH 5.0. |
| $C_1$ | 20-32 | Light reddish brown (5 YR 6/3), gravelly sandy loam; very firm; weakly cemented; pH 5.2. |
| $C_2$ | 32+ | Coarse gravel. |

The lower part of the B horizon and the C horizon may have a reddish cast, but are usually dark grayish brown. The C horizon may be compact and this slows water movement through the soil from both above and below, so that water remains in the upper part of the profile for some time, particularly during the spring months.

*Use*

Small areas have been cleared for pasture, but practically none of these soils are used for crops. They require about the same management practices as the Hebert and Digby soils, with special attention given to drainage. The soils are very dry during the summer and probably their best use is for forest.

### Millar Series (6,640 acres)

Millar soils occur in all countries of the Island. Their total area is small and they are not important agriculturally. The largest tracts are in Inverness County around River Denys and Upper River Denys. These soils are in poorly

drained positions associated with the Canning and Cumberland soils, and the parent material is alluvial sediments that have been washed from the soils at higher elevations. The topography is level to slightly depressional and water may remain on the surface for a large part of the year. Where drainage is severely restricted, the soils grade into peat bogs. Stone may be found on the surface in a few areas, but generally the surface is free from stone. The principal tree cover is black spruce, red maple, poplar, tamarack and alder. The profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L | 6- 5 | Moss, sedges and leaf litter. |
| F | 5- 2 | Semidecomposed moss and sedge; spongy; fibrous. |
| H | 2- 0 | Black, semidecomposed organic matter; greasy mor; numerous roots; pH 3.8. |
| Ah | 0- 2 | Black silt loam; mucky in appearance. |
| Aeg | 2- 8 | Light brownish gray (10 YR 6/2) loamy sand to sandy loam; prominently mottled with gray patches. |
| Bg | 8-15 | Yellowish-brown (10 YR 5/4) sandy loam; firm; prominently mottled with strong brown; becoming light reddish brown and firmer in the lower part. |
| C | 15+ | Reddish-brown (5 YR 4/3) loamy sand; firm; mottled; some gravel. |

The Ae horizon ranges from gray to pinkish gray and the Bg from grayish brown to dark reddish brown. The pH of the profile varies with location, because in some areas lime has washed into the depressions from the bedrock surrounding the area. In many places there is no Ah horizon and the L-H horizon is peaty. Some of the soils have very weak horizon development.

*Use*

Most of the Millar soils are unsuitable for cultivation unless the drainage is improved. Some of the larger areas, such as around Upper River Denys, would then provide a considerable area of agricultural land. Where they are reasonably dry during the summer, the soils are suitable for pasture.

### Meteghan Series (1,172 acres)

The Meteghan soils occur in all counties except Richmond, the largest areas being in Inverness County. These soils are found on poorly drained sites associated with the Hebert and Digby soils and they are developed from similar materials. Surface and internal drainage is restricted by topography and a compact subsoil, so that the soils are wet for much of the year. They are fairly free from stone, the principal problem being drainage. The tree cover is balsam fir, tamarack, black spruce and alder. The typical profile is described as follows:

| *Horizon* | *Depth Inches* | *Description* |
|---|---|---|
| L-H | 8- 0 | Black, semidecomposed organic matter; H layer greasy mor; numerous roots; pH 3.6. |
| Aeg | 0- 4 | Light-gray (10 YR 7/2) sandy loam; fine crumb structure; strong-brown mottles; pH 4.0. |
| Bfhg | 4-12 | Brown (10 YR 5/3) sandy loam; firm; structureless; prominent strong-brown and gray mottles; some cobbles; pH 4.8. |
| Bfg | 12-18 | Pale-brown (10 YR 6/3), gravelly sandy loam; very firm; strongly mottled; pH 5.0. |
| C | 18+ | Grayish-brown (10 YR 5/2), gravelly sandy loam; firm to compact; very gravelly and cobbly; pH 5.0. |

The underlying till is reddish brown and compact and in some places there is a reddish cast to the lower horizons. The boundaries between horizons are frequently indistinct and, in the very poorly drained locations, the colors are faded and dull.

*Use*

The Meteghan soils are not used for agriculture to any extent. Small areas are used for rough pasture, which has a low value. The difficulty of draining this soil makes it best suited to forest.

## Soils Developed from Organic Materials

### Peat (62,658 acres)

Peat soils cover between 2 and 3 per cent of the surveyed area. Some of the larger tracts are in Cape Breton County, but there are large individual areas in all counties. The soils occur in poorly drained depressions or on sites where moisture is excessive for most of the year. About 45 per cent of these soils occur at high elevations on the upland plateau in Inverness and Victoria counties.

Many areas have no trees, but others have scattered stands of tamarack, black spruce and red maple on them. A few areas have boulders scattered on the surface. The ground cover is chiefly sphagnum moss, labrador tea, lambkill, ground juniper, cottongrass, bog rosemary and crowberry.

The surface layer consists of 10 to 15 inches of spaghnum moss and sedges. This is underlain by layers of poorly decomposed material of the same composition. Occasionally, decaying wood is found in the profile. The deposits vary in depth from about 2 to 20 feet. The shallower areas may have a black, mucky layer under several inches of moss and this is, in turn, underlain by mineral soil. Soils having a surface layer of more than 12 inches of peaty material were included with the areas mapped as peat. None of these areas is used for agriculture at present.

## Miscellaneous Land Types

The area covered by this group occupies about 35 per cent of the Island. It comprises soils and soil materials classed as rough mountain land, coastal beach, salt marsh and mine dumps. These soils are either very weakly developed or have been disturbed by man. Their classification is still in doubt, or they occur in such complexity or on such rough land that mapping them would be impractical. They have little agricultural value, but may be suitable for grazing or forestry.

### Rough Mountain Land (919,675 acres)

The area classed as rough mountain land occupies the largest acreage of this group and covers about 34 per cent of the surveyed area. Most of this is in northern Inverness and Victoria counties on the rougher topography of the upland plateau. It includes land having very steep slopes and excessive stoniness, shallowness and wetness. Where profiles are developed on well-drained sites, they resemble those of Thom or Gibraltar soils. Imperfectly and poorly drained sites are common, the soils then resembling the Mira and Arichat series. The parent materials are generally very thin over the bedrock, and numerous peat bogs are scattered throughout this type of land. On most of the areas there is good tree growth, including balsam fir, red spruce, white spruce, wire birch, gray birch, beech, black spruce, tamarack and some pine. There are a few areas where the till is deeper that might be suitable for grazing, but usually access to these areas is difficult. Forest is the best use for most of this land.

### Salt Marsh (876 acres)

Areas along the coast that are periodically flooded by the tide were mapped as salt marsh. The soil materials are reddish-brown sediments of silty clay loam texture that have not been in place long enough to develop a profile. The profile contains semidecomposed grass and sedges trapped in the accumulating sediment and shows a layering effect due to periodic deposition of the fine material. There are no stones in this material and the salt content is moderately high.

At present the salt marsh areas are not used for agriculture to any extent. On the drier sites, some of the natural grasses are cut for forage and some areas are used for pasture. Much of the salt marsh is too wet for agricultural use.

### Coastal Beach (4,654 acres)

Along the coastline of the Island there are many deposits of wave-washed sands or beaches. They are composed of gray sand and gravel, with deposits of coarse, cobbly gravel on the landward side. Though these beaches have no agricultural value, they are excellent sites for recreation. Some of these could be developed as tourist attractions. This would create a market for farm crops in local areas. Some of the gravel is used for construction purposes.

### Mine Dumps (988 acres)

These areas consist of soil and rock materials that have been discarded as waste from mining operations. The material has little or no agricultural value in its present state.

## LAND USE

Land clearing and agricultural development on Cape Breton Island reached its peak about 1890. Since then, large areas have reverted to forest. The cropping practices and crops grown have not changed much since the early days of settlement, except that the introduction of farm machinery has reduced labor. Wheat, which was needed for flour by the early settlers, has been replaced by crops such as hay and pasture for livestock.

At present the 1,975 farms on the Island occupy about 12 per cent of the land (Table 4). The farms average 156 acres, but they range widely in size in each county. In Cape Breton and Richmond counties, about 34 per cent of the farms range from 3 to 69 acres in size; in Inverness and Victoria counties, 23 and 12 per cent respectively. About 30 per cent of the farms in all the counties range from 70 to 130 acres and the remainder from 130 to over 500 acres. There are farms more than 560 acres in size. Inverness County has the greatest number of large farms.

**Table 4.—Acreages and Uses of Farm Land in Various Counties, 1961**

| | Cape Breton | Inverness | Richmond | Victoria | Total |
|---|---|---|---|---|---|
| Number of farms | 418 | 1,046 | 247 | 264 | 1,975 |
| Total land area | 608,553 | 943,537 | 304,120 | 707,960 | 2,564,170 |
| Area in farms | 52,893 | 173,888 | 30,340 | 51,309 | 308,430 |
| Average area per farm | 126 | 166 | 123 | 194 | 156 |
| Improved land | 10,473 | 26,220 | 3,105 | 6,974 | 46,772 |
| Crops | 7,169 | 19,192 | 1,716 | 4,629 | 32,706 |
| Summer fallow | 164 | 80 | 19 | 28 | 291 |
| Pasture | 2,072 | 4,277 | 657 | 1,465 | 8,471 |
| Other | 1,068 | 2,671 | 713 | 849 | 5,301 |
| Improved area per farm | 25 | 25 | 13 | 26 | 23 |
| Unimproved land | 42,420 | 147,668 | 27,235 | 44,335 | 261,568 |
| Woodland | 28,820 | 120,218 | 24,106 | 36,582 | 209,726 |
| Other | 13,600 | 27,450 | 3,129 | 7,753 | 51,932 |

The area of improved land is 46,772 acres, or about 15 per cent of the area in farms. The average area of improved land is 23 acres per farm for the Island and ranges from 12 acres per farm in Richmond County to 26 acres in Victoria County. On many farms the improved area is between 40 and 70 acres. The percentage of improved land is highest in Cape Breton County.

In Cape Breton County the improved land and the farm population are concentrated in the Grand Narrows–Sydney Mines district. In Inverness County, the Cheticamp–Margaree district has the largest area of improved land, but in Richmond County the improved land is well distributed throughout the county. In Victoria County, farm population and production are centered in the Baddeck–St. Ann's district.

From 1956 to 1961 the total farm land decreased 192,537 acres, about 26,000 acres of this being land that had been improved. About 70 per cent of the improved land is used for field crops and by far the largest part of this is in hay land (Table 5). Cape Breton and Richmond counties have about 74 per cent of the crop land in hay, and Victoria and Inverness counties about 84 per cent. Mainly oats, potatoes and other fodder crops are grown on the remaining crop land. Vegetables are an important crop in Cape Breton County, partly because of the large market at Sydney and because of some favorable soil areas.

**Table 5.—Acreages of Field Crops on Cape Breton Island, 1961**

| | Cape Breton | Inverness | Richmond | Victoria | Total |
|---|---|---|---|---|---|
| Hay (including oats cut for hay) | 5,749 | 17,058 | 1,373 | 4,110 | 28,290 |
| Grain (wheat, oats, barley, mixed grain) | 516 | 1,090 | 103 | 281 | 1,990 |
| Fodder crops | 237 | 119 | 58 | 21 | 435 |
| Potatoes | 194 | 497 | 48 | 125 | 864 |
| Vegetables, small fruits, tree fruits | 277 | 243 | 96 | 13 | 629 |
| Turnips, swedes, mangels | 147 | 97 | 10 | 35 | 289 |
| Other | 49 | 88 | 28 | 44 | 209 |

The livestock population of the Island decreased from 1956 to 1961 (Table 6). Cattle, sheep and poultry are the most important livestock. Inverness County is the leading sheep-raising area of the province. Milk production in May, 1956, was more than five million pounds, of which 47 per cent was produced in Inverness and 28 per cent in Cape Breton County. More than half of this was marketed as fluid milk in Sydney. More than 50 per cent of the eggs are produced in Cape Breton County.

A community pasture project organized recently at Cape Mabou in Inverness County stimulated interest in the raising of sheep and beef cattle.

In many parts of the Island, lumbering is an important operation and supplements the farm income. The Island has a large potential source of wealth in its forests (Table 7). Apart from the national park in the northern part of the Island, there are 2,720 square miles of productive forest, 66 per cent being softwood, largely balsam fir and spruce, and about 6 per cent hardwood. A well-planned forestry program could benefit the area greatly.

About 30 per cent of the farms on the Island are classed as commercial crop and livestock farms. On the rest the occupations are mixed farming, fishing–farming (Figure 16) or lumbering–farming. About 95 per cent of the farms had electric power in 1961 and most had motor cars or trucks and other motive power. The larger dairy farms are equipped with milking machines and some have refrigeration facilities.

**Table 6.—Numbers of Livestock in Various Counties, 1956 and 1961**

| | Cape Breton | | Inverness | | Richmond | | Victoria | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1961 | 1956 | 1961 | 1956 | 1961 | 1956 | 1961 | 1956 | 1961 |
| Horses | 715 | 270 | 2,366 | 1,318 | 437 | 150 | 688 | 242 | 4,226 | 1,980 |
| Cattle | 5,288 | 3,629 | 11,717 | 9,881 | 1,886 | 1,824 | 3,626 | 2,531 | 22,517 | 17,325 |
| Cows and heifers milking | 3,495 | 2,333 | 6,071 | 4,436 | 1,053 | 661 | 378 | 1,339 | 10,997 | 8,769 |
| Pigs | 797 | 703 | 1,476 | 1,709 | 142 | 255 | 395 | 156 | 2,810 | 2,942 |
| Sheep | 3,999 | 1,988 | 21,535 | 13,597 | 3,957 | 2,854 | 3,412 | 1,931 | 32,903 | 20,370 |
| Poultry (hens, chickens, turkeys, geese, ducks) | 139,107 | 112,901 | 28,684 | 26,537 | 14,633 | 11,172 | 23,013 | 13,396 | 205,437 | 164,006 |

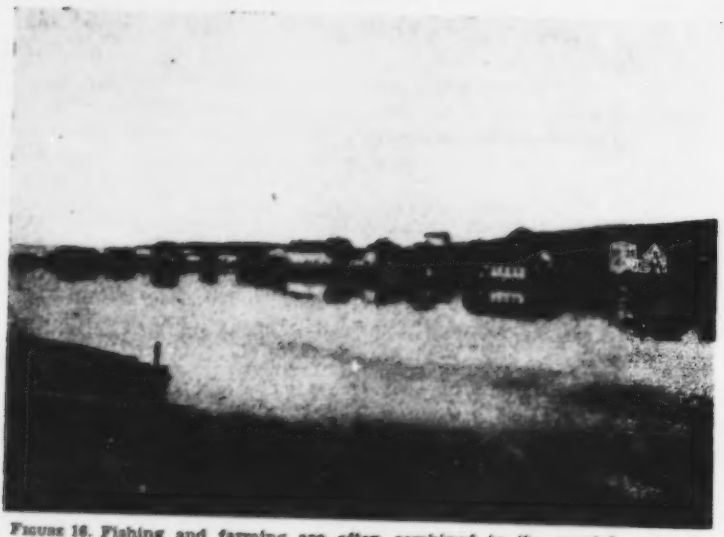

FIGURE 16. Fishing and farming are often combined in the coastal areas of Cape Breton.

**Table 7.—Square Miles of Various Forest Resources in Cape Breton, 1958[1]**

| County | Cape Breton | Inverness | Richmond | Victoria | Total |
|---|---|---|---|---|---|
| Productive forest | 691 | 983 | 367 | 681 | 2,722 |
| Softwood | 453 | 570 | 331 | 463 | 1,817 |
| Hardwood | 45 | 88 | 3 | 37 | 171 |
| Mixed | 193 | 327 | 33 | 181 | 734 |
| Depleted forest | 14 | 24 | 13 | 9 | 60 |
| Recently cleared | 11 | 22 | 12 | 8 | 53 |
| Recently burned | 3 | 2 | 1 | 1 | 7 |
| Nonforest and nonproductive | 123 | 46 | 99 | 45 | 273 |
| Total | 828 | 1,053 | 439 | 735 | 2,955 |

[1]Hawboldt, L. S., and R. M. Bulmer. The forest resources of Nova Scotia. N.S. Department of Lands and Forests. 1955.

FIGURE 17. On strongly undulating to rolling slopes, Westbrook soils are subject to erosion.

Much of the farming is done on steep slopes (Figures 17 and 18) with no provision for control of erosion.

FIGURE 18. Typical topography of Cape Breton Island. Cumberland soils in the river bottoms and Millbrook soils on the slopes. Rough mountain land in the background.

In general, the farm income is low. There are opportunities for increasing farm revenues through a well-planned program in which livestock, crop and forestry production are well integrated.

## Land-use Capability

The use of land for agricultural purposes depends on a number of physical conditions such as stoniness, wetness, slope, and susceptibility to flooding and erosion. The soils of the area were classified according to the characteristics that make them suitable for use (Figure 19). Only permanent physical land factors such as slope, moisture supply, depth and texture affect the classification. On this basis, the soils on the Island may be divided into two broad land-use groups: those suitable for cultivation and those not suitable.

There are six major classes, in which the physical factors impose increasingly severe limitations on the use of land for crops. Classes I to IV are suitable for agriculture and Classes V to VII, are unsuitable. Each class includes soils that have similar degrees of permanent limitations for use. Within each class, the soils may be grouped according to the kind of physical factors, such as stoniness, wetness, shallowness, and slope or erosion hazard, that limit their use. They may be subdivided further into textural groups that have nearly uniform management requirements and potential uses.

In the tables accompanying the following discussion, the soils are listed with their topographic and stoniness symbols as they appear on the soil map. The symbols for topography are:

| *Symbol* | *Topography* | *Slope* % |
|---|---|---|
| A | Level to gently undulating .... ..... | 0- 3 |
| B | Undulating to gently rolling ..... | 3- 8 |
| C | Strongly undulating to rolling ..... | 8-16 |
| D | Strongly rolling to hilly ..... | 16-30 |

The symbols for stoniness are:

| *Symbol* | *Degree of stoniness* |
|---|---|
| 0 | Stone-free |
| 1 | Slightly stony; no hindrance to cultivation |
| 2 | Moderately stony; enough stone to interfere with cultivation unless removed |
| 3 | Very stony; enough stone to be a serious handicap to cultivation |
| 4 | Excessively stony; nonarable; too stony for cultivation |

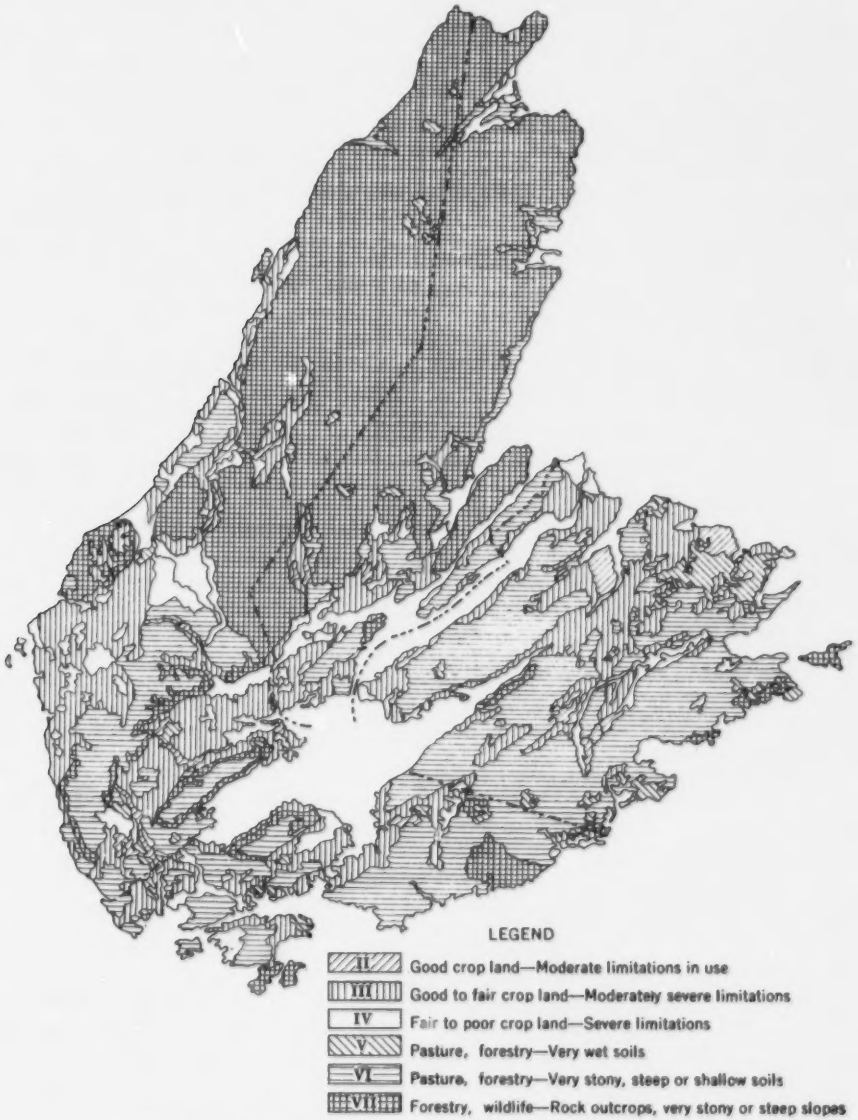
LEGEND
II Good crop land—Moderate limitations in use
III Good to fair crop land—Moderately severe limitations
IV Fair to poor crop land—Severe limitations
V Pasture, forestry—Very wet soils
VI Pasture, forestry—Very stony, steep or shallow soils
VII Forestry, wildlife—Rock outcrops, very stony or steep slopes

FIGURE 19. Land-use capability classes in Cape Breton.

The uses of the soils were discussed in the descriptions of the soil series, but some general remarks on the various capability classes are given in the following discussion.

*Land-use Capability Class I*

There are no soils in this class in Cape Breton Island. The land in this class has few limitations in use. It is level, well drained and easy to work. It holds water well and has moderate to good natural fertility. It can be used for all crops grown in the area as well as for pasture, wildlife or forestry. Good soil management practices are required and the frost-free period must be at least 100 days.

*Land-use Capability Class II*

The land in this class (Table 8) has the widest range in use of all the agricultural land on the Island. It is well suited to all crops grown in the area, as well as for pasture and forest. It has some limitations in use because of seasonal flooding, imperfect drainage or light erosion, but these limitations are readily overcome. Simple management practices are usually enough to keep the land in production. The soils are moderately deep, have favorable texture and are easy to cultivate. The topography ranges from level to gently undulating and there is not enough stone to interfere with cultivation. All soils in this class require liming and fertilization for good crop yields. Nearly 2 per cent of the land area of the Island is in this class.

The Cumberland and Bridgeville soils, which are associated with one another on the flood plains along the rivers throughout the Island, are subject to seasonal flooding. Though small areas occur on individual farms, these soils lend themselves well to a community program of dyking and drainage that would ensure continuous areas of good land that might be suitable for commercial vegetable production. Hay and grain are the main crops now grown on these soils. The Kingsport soils require simple drainage before use.

The fine-textured Falmouth and Woodbourne soils in this class are somewhat better suited to hay and forage crops than the coarser-textured soils. Some erosion occurs on these soils when hoed crops are grown. With proper protective measures, all crops suitable to the area grow well. The coarser-textured Shulie, Westbrook, Pugwash and Kirkhill soils make good crop land, but require maintenance of organic matter to ensure good moisture-holding capacity. The associated Debert and Springhill soils have not been cultivated to any extent, partly because of their location and the availability of better-drained areas. With simple drainage these soils have considerable potential for agriculture.

*Land-use Capability Class III*

The land in this class (Table 9) includes moderately good land that has a narrower range of use than that in Class II. More involved management practices are required. There are abut 490,000 acres of land in this class, or nearly 19 per cent of the Island. The main problem on most of the soils is to control moisture.

The fine-textured Queens, Millbrook, Falmouth and Woodbourne soils in this class are suitable for most crops grown in the area, but the Queens and Millbrook soils are somewhat better suited to hay and pasture than the other soils in this group. Much of the agricultural production of the Island is derived from these fine-textured soils. The internal drainage is moderately rapid to slow, but surface drainage is moderately good. The soils are slow to warm up in the spring. On C slopes (8-16 per cent), erosion may limit use of these soils for intertilled crops.

**Table 8.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class II, Those with Moderate Limitations**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Nearly level to gently sloping land with moderate susceptibility to erosion. Soils have moderate depth, favorable texture, occasional moderate overflows, or wetness correctable by drainage. They can be cultivated with easily applied practices such as terracing, protective cover crops and simple water-management operations. | Occasional overflows or seasonal wetness | Medium-textured water-deposited soils | Cumberland | A-0[1] | 10,166 |
| | | | | A-1 | 617 |
| | | | | B-1 | 2,268 |
| | | | Bridgeville | A-0 | 2,033 |
| | | | | A-1 | 51 |
| | | | | B-1 | 350 |
| | | | Kingsport | A-0 | 510 |
| | | | | A-1 | 478 |
| | | | | B-0 | 12 |
| | | | | | 16,485 |
| | Moderate to light erosion with hoed crops | Moderately fine textured soils | Falmouth | A-1 | 31 |
| | | | | B-1 | 1,195 |
| | | | | B-2 | 120 |
| | | | Woodbourne | B-1 | 135 |
| | | | | B-2 | 6,403 |
| | | | | | 7,884 |
| | | Moderately coarse textured soils | Shulie | A-1 | 12 |
| | | | | B-1 | 546 |
| | | | Pugwash | B-1 | 709 |
| | | | | B-2 | 107 |
| | | | Westbrook | B-1 | 3,878 |
| | | | | B-2 | 4,889 |
| | | | Kirkhill | B-1 | 2,682 |
| | | | | B-2 | 1,351 |
| | | | | | 14,174 |
| | Imperfect drainage | | Debert | B-1 | 3,188 |
| | | | Springhill | A-2 | 40 |
| | | | | B-1 | 6,189 |
| | Simple drainage required | | | | |
| | | | | | 9,417 |
| Total area (Class II) | | | | | 47,960 |

[1]Topography and stoniness. See pages 56-57 of text for explanation.

The moderately coarse textured soils in this class have not been used to any extent for agriculture, except pasture. Certain areas of the Shulie, Torbrook and Westbrook soils are very suitable for row crops and have been used for this purpose. The Mira, Debert and Springhill soils have moderately slow internal drainage and are best suited to pasture in their present state, but could be used for crop land with proper management practices.

The coarse-textured Hebert, Canning, Digby and Comeau soils are limited in use by their low moisture-holding capacity. Their use will depend largely on economic conditions. Certain areas, because of a somewhat finer texture, are more favorable than others for row crops. Droughtiness could be overcome by irrigation and the addition of organic matter. These soils would then be as productive as any in the Island, although the cost of production would be high. In some locations the hazard of frost would limit crop production.

**Table 9.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class III, Those with Moderately Severe Limitations**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Nearly level to moderately steeply sloping land susceptible to moderate erosion. Soils have slow drainage; moderate overflow hazard; excessive wetness, shallowness; low moisture-holding capacity; or low fertility. Water management practices are more complex than for Class II. Choice of crops may be restricted. | Occasional overflows or droughtiness | Medium-textured water-deposited soils | Cumberland | B–2 | 1,024 |
| | | | | | 1,024 |
| | Imperfect drainage Moderate to severe erosion with intertilled crops | Moderately fine textured soils | Queens | A–1 | 36 |
| | | | | A–2 | 394 |
| | | | | B–1 | 5,523 |
| | | | | B–2 | 48,150 |
| | | | | C–1 | 5,591 |
| | | | | C–2 | 44,689 |
| | | | Millbrook | B–2 | 22,400 |
| | | | | C–2 | 70,374 |
| | | | Falmouth | C–1 | 4,901 |
| | | | | C–2 | 7,723 |
| | | | Woodbourne | C–1 | 60,452 |
| | | | | | 270,233 |
| | | Moderately coarse textured soils | Shulie | B–2 | 21,927 |
| | | | | C–1 | 669 |
| | | | | C–2 | 21,553 |
| | | | Thom | B–2 | 2,322 |
| | | | | C–1 | 259 |
| | | | | C–2 | 13,134 |
| | | | Torbrook | B–1 | 1,398 |
| | | | Kirkhill | C–2 | 7,636 |
| | | | Mira | A–2 | 24 |
| | | | | B–2 | 4,184 |
| | | | Debert | B–2 | 7,165 |
| | | | | C–2 | 8,672 |
| | | | Springhill | B–2 | 50,883 |
| | | | | C–1 | 151 |
| | | | | C–2 | 1,008 |
| | | | Westbrook | C–1 | 933 |
| | | | | C–2 | 44,870 |
| | | | | | 186,788 |
| | Low moisture-holding capacity | Coarse-textured soils | Hebert | A–0 | 522 |
| | | | | A–1 | 6,714 |
| | | | | A–2 | 183 |
| | | | | B–1 | 13,009 |
| | | | | B–2 | 12,036 |
| | | | Canning | A–0 | 258 |
| | | | | B–0 | 247 |
| | | | | B–1 | 3,158 |
| | | | Digby | B–1 | 79 |
| | | | | B–2 | 645 |
| | | | Comeau | A–1 | 187 |
| | | | | A–2 | 108 |
| | | | | B–1 | 211 |
| | | | | B–2 | 357 |
| | | | | | 37,708 |
| Total area (Class III) | | | | | 495,753 |

*Land-use Capability Class IV*

On the soils of this class (Table 10), the choice of crops is severely limited by natural features of slope, wetness or droughtiness, and much of the land is more suitable for pasture or forest. In most cases, slope or wetness is the main

reason for not cultivating the soil. The Woodbourne, Millbrook and Queens soils in this class have slopes with severe erosion hazard, but may be used for pasture. The Diligence, Kingsville and Joggins soils have favorable topography, but are slowly permeable to water and late in the spring. Kingsville and Joggins soils are difficult to drain and cultivate, but they make excellent pasture when cleared. These soils are now largely under forest.

The moderately coarse textured soils are also limited by slope and drainage, and usually their location does not make it feasible to use them, except for rough pasture or forest. This also applies to the droughty, coarse-textured soils, and most areas having C slopes are suitable only for forest or road-building materials. Class IV soils occupy nearly 5 per cent of the surveyed area.

**Table 10.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class IV, Those with Severe Limitations**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Steep slopes, severe erosion and adverse climate are some of the limiting factors. Nearly level, imperfectly drained land in this class is late in the spring. The number of years favorable for cultivated crops may be limited (1 in 6). Best suited to hay or pasture. | Imperfect to poor drainage | Moderately fine textured soils | Falmouth | D-1 | 1,593 |
| | | | | D-2 | 912 |
| | | | Woodbourne | D-2 | 3,255 |
| | | | Queens | D-2 | 251 |
| | | | Millbrook | D-2 | 1,354 |
| | | | Diligence | B-1 | 2,758 |
| | | | | B-2 | 10,156 |
| | | | | C-2 | 15,898 |
| | | | | D-2 | 5,902 |
| | | | Kingsville | B-1 | 7,502 |
| | | | | B-2 | 34,297 |
| | | | Joggins | B-1 | 327 |
| | | | | B-2 | 769 |
| | | | | | 85,068 |
| | | Moderately coarse textured soils | Westbrook | D-2 | 6,807 |
| | | | Shulie | D-2 | 932 |
| | | | Kirkhill | D-2 | 203 |
| | | | Bayswater | B-2 | 267 |
| | | | | C-2 | 3,105 |
| | | | Masstown | B-2 | 765 |
| | | | | C-2 | 147 |
| | | | Economy | B-1 | 80 |
| | | | | B-2 | 3,937 |
| | | | Gibraltar | C-2 | 2,523 |
| | | | Arichat | B-2 | 79 |
| | | | Meteghan | B-2 | 64 |
| | | | Millar | B-1 | 317 |
| | | | | | 19,226 |
| | Low moisture-holding capacity | Coarse-textured soils | Hebert | C-1 | 2,451 |
| | | | | C-2 | 7,715 |
| | | | Canning | C-1 | 5,970 |
| | | | | C-2 | 131 |
| | | | Torbrook | C-1 | 1,925 |
| | | | | C-2 | 3,395 |
| | | | Digby | C-1 | 52 |
| | | | | C-2 | 451 |
| | | | | | 22,090 |
| Total area (Class IV) | | | | | 126,384 |

*Land-use Capability Class V*

The land in this class (Table 11) and succeeding classes is not considered suitable for cultivation. This class includes nearly level land that has permanent wetness, stoniness or frequent overflow that discourages its use for crop land. Drainage is difficult because of topography and location. Some of the areas are suitable for pasture. Forestry is the best use for the soils in this class, which occupies slightly more than 1 per cent of the Island.

**Table 11.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class V, Those Suitable for Grazing or Forestry**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Nearly level land with permanent wetness, frequent overflows or climate that restricts the cultivation of crops. Not generally suitable for cultivation. | Excessive wetness | Fine-textured soils | Kingsville | A–0 | 725 |
| | | | | A–1 | 159 |
| | | | | A–2 | 8,341 |
| | | | Joggins | A–1 | 61 |
| | | | | | 9,376 |
| | | Moderately coarse textured soils | Masstown | A–1 | 20 |
| | | | | A–2 | 1,442 |
| | | | Economy | A–1 | 701 |
| | | | | A–2 | 24,132 |
| | | | Arichat | A–2 | 28 |
| | | | Meteghan | A–0 | 808 |
| | | | | A–1 | 107 |
| | | | | A–2 | 191 |
| | | | Millar | A–0 | 5,656 |
| | | | | A–1 | 494 |
| | | | | A–2 | 171 |
| | | | | | 33,750 |
| Total area (Class V) | | | | | 43,126 |

*Land-use Capability Class VI*

The soils in this class (Table 12) are too steep, stony, droughty, shallow or wet for cultivation. Most areas are better suited to forest, but there are local clearings that could be used for grazing with careful management. Land in this class occupies about 30 per cent of the surveyed area.

**Table 12.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class VI, Those Limited in Use for Grazing but Suitable for Forest**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Steep, stony, eroded, shallow, wet or droughty land. Suitable for forest or for grazing with moderate limitations. | Imperfect to poor drainage, or stoniness | Moderately fine textured soils | Woodbourne | B–3 | 28 |
| | | | | C–3 | 7,047 |
| | | | Queens | B–3 | 6,670 |
| | | | | C–3 | 3,373 |
| | | | Millbrook | B–3 | 13,728 |
| | | | | C–3 | 12,835 |
| | | | Diligence | B–3 | 13,997 |
| | | | | C–3 | 1,462 |
| | | | Kingsville | A–3 | 737 |
| | | | | B–3 | 4,477 |
| | | | Joggins | A–3 | 83 |
| | | | | B–3 | 199 |
| | | | | | 64,996 |

**Table 12.—concluded**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| | | Moderately coarse textured soils | Westbrook | C–3 | 8,206 |
| | | | | D–3 | 46,322 |
| | | | Shulie | B–3 | 26,539 |
| | | | | C–3 | 51,523 |
| | | | | D–3 | 18,914 |
| | | | Thom | B–3 | 44,257 |
| | | | | C–3 | 336,634 |
| | | | | D–3 | 38,784 |
| | | | Kirkhill | B–3 | 2,383 |
| | | | | C–3 | 6,679 |
| | | | Gibraltar | B–3 | 151 |
| | | | | C–3 | 8,413 |
| | | | Mira | A–3 | 410 |
| | | | | B–3 | 35,571 |
| | | | | C–3 | 4,623 |
| | | | Debert | B–3 | 32 |
| | | | | C–3 | 7,272 |
| | | | Springhill | B–3 | 16,066 |
| | | | | C–3 | 8,644 |
| | | | Comeau | B–3 | 343 |
| | | | Bayswater | B–3 | 175 |
| | | | | C–3 | 2,188 |
| | | | | D–3 | 156 |
| | | | Economy | A–3 | 2,969 |
| | | | | B–3 | 1,207 |
| | | | Masstown | B–3 | 131 |
| | | | Arichat | A–3 | 13,950 |
| | | | | B–3 | 9,753 |
| | | | Aspotogan | B–3 | 100 |
| | | | | | 692,495 |
| | Low moisture-holding capacity, or stoniness | Coarse-textured soils | Hebert | B–3 | 4,418 |
| | | | | C–3 | 8 |
| | | | | D–2 | 1,995 |
| | | | Digby | D–2 | 183 |
| | | | | | 6,604 |
| Total area (Class VI) | | | | | 764,095 |

*Land-use Capability Class VII*

Most of the land in this class (Table 13) is suitable only for forest. It includes very steep and stony land, wet land and steep mountain slopes. This class comprises about 40 per cent of the land area of the Island and much of it occurs on the upland plateau. On top of this plateau there are occasional smoother areas that are suitable for grazing, but accessibility has to be considered in the use of this type of land.

## Crop Adaptability Ratings

In the discussion above, the soils were grouped according to the characteristics that limit their use. Where soils are suitable for crop land, they vary widely in their ability to produce a specified crop because of the inherent factors of natural fertility and physical composition. Crop yields are the best measure of this ability, but these data are difficult to obtain for most of the crops grown in the area except under controlled conditions.

Management is an important factor in production. A poor soil under good management may yield as well as, or better than, good soils under poor management. In some cases, changes in management practices might produce

better yields at the same cost, but usually the yields observed in an area over a period of years represent the range to be expected under prevailing systems of management. Unfortunately, reliable figures for yields on all soil types are not available.

**Table 13.—Descriptions, Series and Acreages of Soils of Cape Breton Island in Land-use Capability Class VII, Those Suitable for Forestry and Wildlife**

| Land-use Capability | Limitations | Texture | Soil series, topography and stoniness | | Acres |
|---|---|---|---|---|---|
| Very stony, steep, rocky, shallow, droughty or swampy land. Chiefly useful for forestry and wildlife. Limited areas suitable for grazing. | Stoniness or imperfect to poor drainage | Moderately fine textured soils | Woodbourne | D–4 | 100 |
| | | | | | 100 |
| | | Moderately coarse textured soils | Westbrook | E–3 | 7,747 |
| | | | Shulie | B–4 | 155 |
| | | | Thom | B–4 | 1,647 |
| | | | | C–4 | 6,908 |
| | | | | D–4 | 5,196 |
| | | | | E–3 | 18,089 |
| | | | | E–4 | 28,580 |
| | | | Gibraltar | B–4 | 817 |
| | | | | C–4 | 14,776 |
| | | | Rough mountain land | | 919,675 |
| | | | Springhill | B–4 | 206 |
| | | | Mira | A–4 | 40 |
| | | | | B–4 | 4,170 |
| | | | Bayswater | B–4 | 637 |
| | | | Economy | A–4 | 56 |
| | | | | B–4 | 100 |
| | | | Arichat | A–4 | 3,868 |
| | | | | B–4 | 5,250 |
| | | | Aspotogan | A–4 | 650 |
| | | | | B–4 | 856 |
| | | | | | 1,019,423 |
| Total area (Class VII) | | | | | 1,019,523 |

The ratings of the soils for specific crops (Table 14) are based largely on observations made during the survey and on a knowledge of the characteristics of the soils. Soils that are suited to a variety of crops are rated more highly than those adaptable to only a few crops. Certain soils may be extremely valuable for a particular crop if conditions are favourable, but rate low in general suitability. The ratings apply to those areas of each soil that are suitable for cultivation. The soils were grouped into five classes ranging from good to poor crop land.

The major differences in the soils of the surveyed area are related to the variations in the texture of the parent materials and in drainage conditions. These conditions are reflected in the availability of soil moisture, drainage, fertility and erodibility.

When a soil has all the moisture it can hold against the pull of gravity, it is said to be at field capacity. The difference between the moisture at field capacity and at a point low enough to permit wilting is the available soil moisture.

**Table 14.—Ratings[1] of Soils in Classes II-IV for Selected Crops[2]**

| Series | Acres | Hay | Grain | Pasture | Potatoes | Vegetables |
|---|---|---|---|---|---|---|
| Class II. Good Crop Land | | | | | | |
| Cumberland | 13,046 | E | E | G | E | E |
| Bridgeville | 2,434 | G | F | G | F-P | P |
| Kingsport | 1,000 | G | G | F | F | F-G |
| Falmouth | 1,346 | E | G | E | F | F-G |
| Woodbourne | 6,538 | G | G | G | F | F |
| Shulie | 558 | F | F | F | F-G | F-G |
| Pugwash | 816 | G | G | G | G | G |
| Westbrook | 8,767 | G | F-G | G | F-G | F |
| Kirkhill | 4,033 | G | G | F | G | G |
| Debert | 3,188 | F-G | F | F-G | F | F |
| Springhill | 6,629 | F-G | F | G | F-P | F |
| Class III. Good to Fair Crop Land | | | | | | |
| Cumberland | 1,024 | F-G | F-G | F-G | F | F |
| Queens | 104,383 | G | G | E-G | P | P |
| Millbrook | 92,774 | G | G | G | P | P |
| Falmouth | 12,624 | G | F-G | G | P | P |
| Woodbourne | 60,452 | F-G | F | F-G | F-P | F-P |
| Shulie | 44,149 | F-G | F | F-G | F | F |
| Thom | 15,715 | F | F | F | F-G | F-G |
| Torbrook | 1,398 | F | F | F-P | G | G |
| Kirkhill | 7,636 | F | F | F | F | F |
| Mira | 4,208 | F | F | G | F | F |
| Debert | 15,837 | G | G | G | P | P |
| Springhill | 52,042 | F-G | F | G | P | P |
| Westbrook | 41,970 | F-G | F | F | F-G | F |
| Hebert | 32,464 | F | F | F-P | F-G | F-G |
| Canning | 3,657 | F | F | F | F-G | F-G |
| Digby | 724 | F | F | F | F | F |
| Comeau | 863 | F-G | F | F-G | P | F-P |
| Class IV. Fair to Poor Crop Land | | | | | | |
| Falmouth | 2,509 | P | P | F | P | P |
| Woodbourne | 3,255 | P | P | F | P | P |
| Queens | 251 | P | P | F | P | P |
| Millbrook | 1,354 | P | P | F | P | P |
| Diligence | 34,714 | P | P | F | P | P |
| Kingsville | 41,889 | F-G | F | G | P | P |
| Joggins | 1,096 | P | P | F | P | P |
| Westbrook | 6,807 | P | P | F-P | P | P |
| Shulie | 932 | P | P | F | P | P |
| Kirkhill | 203 | P | P | F-P | P | P |
| Bayswater | 3,372 | F | F | F | F-P | F-P |
| Masstown | 912 | F-P | P | F-G | P | P |
| Economy | 4,107 | P | P | F-P | P | P |
| Gibraltar | 2,523 | F | F | F | F-P | F-P |
| Arichat | 79 | P | P | F | P | P |
| Meteghan | 64 | P | P | F | P | P |
| Millar | 317 | P | P | F-G | P | P |
| Hebert | 10,166 | P | P | P | P | P |
| Canning | 6,101 | P | P | P | P | P |
| Torbrook | 5,320 | P | P | F | F | F |
| Digby | 503 | P | P | F-P | F | F |

[1]E, excellent; G, good; F, fair; P, poor; F-G, fair to good; F-P, fair to poor.
[2]Classes V to VII are unsuitable for agriculture.

Coarse-textured sandy soils hold small amounts of available moisture and tend to become dry during the summer. The fine-textured soils hold the most water at field capacity, but less of the water is available to plants. Loam soils absorb fairly large amounts of water and have more available for plant use than either the sands or clays. Fine-textured soils at field capacity may have poor aeration and be unsuitable for plant growth.

Where soils are poorly drained, some method of removing water is necessary before crop production is practical. On soils having high natural

fertility, or where market conditions are especially favourable, it may be profitable to install tile drains. On the finest-textured soils the cost would be very high and surface drains would be more practical. The drainage of such soils favors the decomposition of accumulated organic matter, and one of the beneficial results of drainage is to increase the nitrogen available for plant use.

The natural fertility of the soil is influenced to some extent by texture. On open, sandy soils the percolation of water removes nutrients rapidly. The finer-textured soils are not so readily leached and also contain more material that acts as an exchange complex, but they are usually acid in the surface and require liming. Most crops grown in the surveyed area respond to applications of phosphorous, which is one of the major elements lost in leaching.

The erodibility of the soils depends on the cover, texture, degree and length of slope and amount of organic matter. Practically all of the erosion taking place in the area is caused by water. On the sandier soils, water is absorbed more readily and runoff is less than on the fine-textured soils having similar slopes. However, the particles are more easily dislodged from the coarser soils than from the fine-textured ones by the same amount of water. To prevent erosion it is necessary to slow the flow of water over the surface and, where the soils are cultivated, this may be accomplished by contouring, strip cropping or terracing.

## PHYSICAL AND CHEMICAL COMPOSITION OF THE SOILS

Physical and chemical analyses of some of the major soil types of the Island (Table 15) give some idea of the range in composition of the soils of the area and also of the processes that have taken place during soil development. The analyses for total nutrients give some indication of the potential nutrient supply and the figures for available and exchangeable nutrients indicate the part of the supply immediately available to plants. There is no direct relationship between the total and available supplies, as this depends on a number of factors. The available supply may also vary with location, time of sampling and treatment after sampling, so that these figures can only be used as a general guide in predicting crop response.

All of the soils are acid in reaction in the upper part of the profile and evidently need lime. In some areas, the Queens and Kingsville soils tend to accumulate some free carbonates in the lower subsoil and are mildly alkaline in that part of the profile. The podzolization process is indicated by the accumulation of sesquioxides and iron in the B horizon and the presence of a highly siliceous Ae horizon. This is more pronounced in the sandier soils than in the soils developed from fine-textured materials. In some cases, an increase in organic matter and clay is noticeable in the B horizon.

In general, the Thom soils are relatively high in total calcium and magnesium, like the parent rock material, but availability of these elements is lower than in some of the other soils. The fine-textured soils have a greater proportion of available nutrients due to larger amounts of clay, which acts as an exchange complex, and the supply of nutrients increases with depth. High availability of phosphate is related to a high organic matter content and high pH value.

## Table 15.—Chemical and Physical Analyses of Representative Soil Profiles of Cape Breton Island

| Horizon | Depth Inches | Loss on ignition % | pH | Total C % | Total N % | Total $SiO_2$ % | Total $R_2O_3$ % | Total $Fe_2O_3$ % | Free $Fe_2O_3$ % | Total CaO % | Total MgO % | Exchangeable bases m.e./100 gm.soil H | Ca | Mg | K | Gravel % | Sand 2-.05 mm. % | Silt .05-.002 mm. % | Clay below .002 mm. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Falmouth Clay Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 2—0 | 58.46 | 3.9 | 34.72 | .94 | 30.07 | 3.82 | | .32 | .81 | .32 | 11.3 | 4.06 | 3.63 | 1.20 | | | | |
| Ae | 0—2 | 2.03 | 4.0 | .62 | .11 | 87.62 | 10.05 | | .48 | .16 | .36 | 4.7 | 4.56 | .33 | .04 | 1.7 | 25.8 | 58.4 | 15.8 |
| Bfh | 2—10 | 4.82 | 5.0 | 1.09 | .06 | 71.16 | 20.51 | | 1.71 | .24 | 1.80 | 8.4 | 2.93 | 1.30 | .11 | .7 | 23.8 | 46.4 | 29.8 |
| Bf | 10—20 | 3.42 | 5.0 | .45 | .20 | 74.02 | 18.96 | | 1.33 | .27 | 1.80 | 7.2 | 1.80 | .52 | .12 | .5 | 24.8 | 48.0 | 27.2 |
| C | 20+ | 3.14 | 4.9 | .24 | .04 | 72.09 | 20.00 | | 1.88 | .30 | .35 | 5.7 | 3.20 | 1.46 | .13 | 1.2 | 24.8 | 47.0 | 28.2 |
| **Queens Silt Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 5—0 | 88.71 | 3.6 | 48.17 | 1.83 | 8.30 | 1.20 | .80 | | .32 | .24 | 77.4 | 5.61 | 7.74 | 2.01 | | | | |
| Ae | 0—2 | 4.63 | 4.2 | 1.42 | .09 | 76.43 | 17.40 | 4.10 | 2.27 | .20 | .99 | 12.6 | .64 | .17 | .00 | 3.6 | 13.1 | 66.3 | 20.6 |
| Bfg | 2—10 | 6.40 | 4.3 | 1.66 | .10 | 67.51 | 23.97 | 7.00 | 3.26 | .18 | 1.22 | 19.7 | .19 | .22 | .19 | 6.8 | 13.1 | 52.0 | 34.9 |
| Bg | 10—20 | 4.56 | 4.8 | .70 | .06 | 68.75 | 24.01 | 6.20 | 1.92 | .18 | 1.54 | 10.8 | .19 | .17 | .12 | 17.6 | 12.5 | 56.2 | 31.3 |
| C | 20+ | 3.47 | 5.0 | .21 | .04 | 69.89 | 23.47 | 6.05 | 1.92 | .19 | 1.33 | 7.0 | .80 | .47 | .10 | 20.1 | 22.1 | 51.3 | 26.6 |
| **Queens Loam** | | | | | | | | | | | | | | | | | | | |
| Aa | 0—6 | 6.90 | 5.1 | 2.71 | .15 | 72.47 | 14.47 | | | .34 | .85 | 4.8 | 5.38 | .75 | .11 | 2.0 | 43.0 | 34.8 | 22.2 |
| L-H | 2—0 | 79.98 | 3.9 | 42.35 | 1.27 | 16.02 | 1.87 | | .16 | .81 | .29 | 60.7 | 4.38 | 4.44 | .82 | | | | |
| Ae | 0—5 | 2.35 | 4.2 | .64 | .04 | 85.44 | 10.35 | | .14 | .30 | .43 | 7.2 | .54 | .38 | .05 | 3.0 | 33.8 | 46.2 | 20.0 |
| Bfg | 5—10 | 3.20 | 4.5 | .57 | .04 | 75.08 | 17.95 | | 2.11 | .30 | 1.20 | 8.6 | .84 | .27 | .03 | 8.7 | 30.2 | 40.6 | 29.2 |
| Bg | 10—20 | 2.17 | 5.5 | .52 | .03 | 74.74 | 18.44 | | 1.29 | .57 | 1.50 | 1.9 | 4.92 | .96 | .11 | 4.0 | 26.2 | 47.2 | 26.6 |
| C | 20+ | 2.99 | 7.7 | .36 | .02 | 70.55 | 20.07 | | 1.44 | 1.35 | 1.67 | | 7.82 | .76 | .13 | 8.3 | 37.2 | 32.6 | 30.2 |
| **Kingsville Clay Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 2—0 | 70.97 | 3.9 | 38.14 | .85 | 22.08 | 4.99 | | .32 | .67 | .44 | 64.3 | 2.82 | 7.44 | .35 | | | | |
| Aag | 0—3 | 4.16 | 4.0 | 1.01 | .06 | 76.10 | 17.69 | | .28 | .16 | .74 | 13.7 | .14 | .21 | .07 | 2.8 | 16.6 | 42.2 | 41.2 |
| Bg | 3—9 | 4.23 | 4.3 | .66 | .06 | 68.22 | 24.02 | | 4.48 | .22 | 1.07 | 7.3 | .38 | .68 | .09 | 3.4 | 20.6 | 35.2 | 44.2 |
| Bg | 9—21 | 3.70 | 4.8 | .30 | .04 | 66.95 | 25.17 | | 2.11 | .24 | 1.52 | 6.0 | 1.23 | 1.22 | .15 | 5.0 | 27.2 | 31.0 | 41.8 |
| $C_1$ | 21—36 | 4.02 | 6.3 | .24 | .05 | 69.86 | 28.83 | | 2.21 | .48 | 2.05 | 0.0 | 5.77 | 3.94 | .19 | 4.1 | 16.8 | 33.0 | 50.2 |
| $C_2$ | 36+ | 3.70 | 8.0 | .19 | .04 | 59.91 | 27.07 | | 1.72 | 2.30 | 2.47 | 0.0 | 9.31 | 3.70 | .24 | .2 | 16.2 | 29.8 | 54.2 |
| **Woodbourne Clay Loam** | | | | | | | | | | | | | | | | | | | |
| Aa | 0—6 | 10.31 | 4.7 | 4.18 | .31 | 65.75 | 18.80 | | | .34 | .96 | 12.6 | 1.34 | .40 | .11 | 35.2 | 33.4 | 35.4 | 31.2 |
| L-H | 2—0 | 75.78 | 3.7 | 41.68 | 1.15 | 19.84 | 3.21 | 1.75 | | .44 | .41 | 72.7 | 7.65 | 4.00 | 1.89 | | | | |
| Ae | 0—2 | 1.56 | 3.9 | .43 | .03 | 89.70 | 8.13 | .75 | 1.42 | .22 | .32 | 5.8 | .03 | .14 | .04 | 22.6 | 21.9 | 71.2 | 66.9 |
| Bfh | 2—10 | 6.61 | 5.0 | 1.67 | .04 | 67.88 | 22.99 | 4.86 | 2.70 | .36 | .89 | 9.5 | .03 | .11 | .08 | 27.0 | 22.8 | 38.0 | 11.2 |
| Bf | 10—18 | 3.76 | 5.0 | .58 | .06 | 70.92 | 23.08 | 5.95 | 1.72 | .19 | 1.48 | 4.4 | .03 | .06 | .06 | 38.3 | 29.2 | 61.4 | 9.4 |
| C | 18+ | 2.71 | 4.9 | .10 | .03 | 71.82 | 23.27 | 5.70 | 1.66 | .13 | 1.55 | 5.1 | .03 | .17 | .13 | 35.7 | 32.9 | 55.2 | 11.9 |
| **Millbrook Silt Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 3—0 | 58.07 | 4.0 | 37.29 | .85 | 35.80 | 4.56 | | .35 | .56 | .38 | 40.0 | 2.55 | 3.06 | .91 | | | | |
| Ae | 0—3 | 1.59 | 4.2 | .54 | .04 | 89.62 | 7.49 | | .17 | .33 | .28 | 4.1 | .65 | .32 | .03 | 10.6 | 38.6 | 51.8 | 9.6 |
| $Bfg_1$ | 3—8 | 3.23 | 5.0 | .43 | .04 | 76.18 | 16.93 | | 1.41 | .48 | 1.56 | 5.5 | .57 | .31 | .06 | 28.4 | 45.2 | 32.0 | 22.8 |
| $Bfg_2$ | 8—15 | 3.14 | 4.9 | .19 | .03 | 72.35 | 20.73 | | 1.43 | .48 | 1.80 | 6.1 | 2.06 | 1.12 | .15 | 15.7 | 38.8 | 28.0 | 33.2 |
| C | 15+ | 2.87 | 6.3 | .12 | .02 | 72.70 | 19.39 | | 1.43 | .89 | 1.94 | 1.1 | 3.97 | 2.17 | .12 | 16.6 | 38.2 | 29.0 | 32.8 |

**Table 15 continued**

| Horizon | Depth Inches | Loss on ignition % | pH | Total C % | Total N % | Total $SiO_2$ % | Total $R_2O_3$ % | Total $Fe_2O_3$ % | Free $Fe_2O_3$ % | Total CaO % | Total MgO % | Exchangeable bases m.e./100 gm.soil H | Ca | Mg | K | Gravel % | Sand 2-.05 mm. % | Silt .05-.002 mm. % | Clay below .002 mm. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kirkhill Silt Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 2–0 | 48.65 | 3.8 | 28.47 | 1.03 | 34.58 | 14.09 | 3.11 | | .78 | .48 | 58.1 | 2.47 | 1.85 | .63 | | | | |
| Ae | 0–2 | 7.14 | 4.2 | 2.66 | .27 | 71.93 | 17.95 | 2.82 | | .07 | .40 | 22.9 | .29 | .15 | .11 | 13.4 | 10.6 | 63.8 | 25.6 |
| Bfh | 2–10 | 9.71 | 4.7 | 3.02 | .17 | 59.10 | 26.93 | 7.40 | | .08 | .91 | 20.8 | | | .19 | 14.4 | 16.8 | 54.8 | 28.4 |
| Bf | 10–18 | 4.34 | 4.7 | .90 | .07 | 65.59 | 25.23 | 6.35 | 1.93 | .10 | 1.15 | 9.1 | .25 | .12 | .13 | 16.9 | 26.2 | 55.9 | 17.9 |
| C | 18+ | 3.34 | 5.0 | .24 | .05 | 66.49 | 25.42 | 6.39 | 1.52 | .10 | 1.26 | 5.5 | .26 | .49 | .14 | 12.1 | 20.2 | 60.3 | 19.5 |
| **Diligence Clay Loam** | | | | | | | | | | | | | | | | | | | |
| Aa | 0–6 | 11.04 | 4.8 | 4.87 | .29 | 67.04 | 18.34 | | | 1.13 | .58 | 12.6 | 3.50 | 1.21 | .18 | 13.0 | 25.6 | 37.2 | 37.2 |
| L-H | 2–0 | 86.39 | 4.2 | 47.27 | 1.70 | 9.91 | 2.47 | | .19 | .63 | .39 | 61.1 | 4.12 | 5.90 | .43 | | | | |
| Ae | 0–3 | 2.50 | 3.7 | .87 | .06 | 89.90 | 7.40 | | .31 | .12 | .28 | 3.3 | .32 | .36 | .01 | 19.6 | 39.8 | 47.0 | 13.2 |
| Bfg | 3–10 | 4.71 | 4.1 | 1.03 | .07 | 72.73 | 20.15 | | 2.46 | .12 | .87 | 11.8 | .18 | .36 | .05 | 3.0 | 11.2 | 51.6 | 37.2 |
| Bg | 10–17 | 5.35 | 4.5 | .76 | .07 | 65.46 | 25.34 | | 2.76 | .09 | 1.19 | 15.5 | .18 | .48 | .22 | 15.0 | 16.8 | 38.0 | 45.2 |
| C | 17+ | 4.51 | 4.7 | .22 | .06 | 64.32 | 27.22 | | 1.86 | .31 | 1.51 | 12.9 | .18 | .47 | .24 | 9.3 | 16.8 | 34.2 | 49.0 |
| **Westbrook Sandy Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 3–0 | 31.66 | 4.0 | 18.40 | .71 | 57.75 | 7.95 | 2.72 | | .61 | .33 | 40.0 | 10.21 | 1.55 | .58 | | | | |
| Ae | 0–2 | 1.55 | 4.1 | .31 | .04 | 90.57 | 7.32 | 1.52 | 1.64 | .18 | .21 | 2.6 | .22 | .06 | .05 | 21.2 | 50.6 | 37.4 | 8.0 |
| Bfh | 2–12 | 4.30 | 4.5 | 1.54 | .06 | 81.27 | 12.10 | 3.53 | 1.73 | .22 | .46 | 8.8 | .63 | | .07 | 18.4 | 52.3 | 36.8 | 10.9 |
| Bf | 12–21 | 3.30 | 4.6 | .96 | .05 | 77.58 | 15.92 | 4.43 | 2.01 | .35 | 1.15 | 7.1 | .14 | .06 | .06 | 15.7 | 52.8 | 22.4 | 14.8 |
| C | 21+ | 2.71 | 4.7 | .26 | .03 | 74.35 | 18.41 | 5.24 | .61 | .27 | 1.52 | 7.3 | .17 | .12 | .08 | 11.6 | 51.0 | 29.7 | 19.3 |
| **Westbrook Sandy Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 2–0 | 60.00 | 3.9 | 29.31 | 1.46 | 32.07 | 4.75 | 1.76 | | .80 | .28 | 56.7 | 8.67 | 3.75 | 1.00 | | | | |
| Ae | 0–1 | 3.22 | 4.1 | 1.06 | .06 | 73.36 | 18.34 | 2.30 | .66 | .78 | .42 | 9.5 | .22 | .22 | .05 | 9.1 | 45.1 | 46.3 | 8.6 |
| Bfh | 1–5 | 11.86 | 4.7 | 4.62 | .26 | 67.16 | 18.00 | 5.70 | 2.54 | .94 | .92 | 18.4 | .14 | .17 | .09 | 12.4 | 43.9 | 43.6 | 12.5 |
| $Bf_1$ | 5–18 | 6.94 | 4.8 | 2.36 | .13 | 71.30 | 17.90 | 5.10 | 1.40 | 1.11 | 1.21 | 10.9 | .08 | .25 | .06 | 25.9 | 46.1 | 46.7 | 7.2 |
| $Bf_2$ | 18–26 | 5.61 | 4.9 | 1.97 | .11 | 70.96 | 18.43 | 4.80 | 1.02 | 1.25 | 1.67 | 9.1 | .11 | .03 | .06 | 26.8 | 56.0 | 38.9 | 6.1 |
| C | 26+ | 2.45 | 5.1 | .28 | .02 | 72.79 | 18.53 | 4.60 | .38 | 1.09 | 1.09 | 3.7 | .08 | .00 | .04 | 30.3 | 58.3 | 40.4 | 1.3 |
| **Westbrook Gravelly Sandy Loam** | | | | | | | | | | | | | | | | | | | |
| Aa | 0–6 | 6.80 | 4.6 | 2.76 | .20 | 74.05 | 15.31 | | | .20 | 1.30 | 9.0 | .66 | .54 | .13 | 28.3 | 68.6 | 29.1 | 24.3 |
| Ae | 0–3 | 1.81 | 3.8 | .56 | .06 | 88.97 | 8.16 | | .31 | .16 | .33 | 4.0 | .36 | .21 | .02 | 42.5 | 50.7 | 29.8 | 10.5 |
| $Bfh_1$ | 3–14 | 8.94 | 4.9 | 3.48 | .18 | 66.23 | 18.02 | | 2.46 | .84 | 1.03 | 11.9 | .22 | .29 | .06 | 52.8 | 65.7 | 23.1 | 11.2 |
| $Bfh_2$ | 14–24 | 9.85 | 4.9 | 2.89 | .15 | 67.17 | 19.36 | | 2.76 | .88 | .98 | 9.8 | .25 | .18 | .04 | 45.5 | 65.2 | 24.3 | 10.5 |
| C | 24+ | 3.00 | 4.8 | .74 | .05 | 74.72 | 19.32 | | 1.86 | .63 | 1.08 | 8.1 | .25 | .11 | .05 | 30.5 | 76.0 | 18.3 | 5.7 |
| **Debert Silt Loam** | | | | | | | | | | | | | | | | | | | |
| L-H | 2–0 | 80.48 | 3.8 | 29.86 | .76 | 38.88 | 9.13 | 4.73 | | .48 | .68 | 57.1 | 1.61 | .94 | .62 | | | | |
| Ae | 0–2 | 3.80 | 4.2 | 1.68 | .08 | 83.97 | 11.46 | 1.82 | .96 | .56 | 1.42 | 12.2 | .05 | .22 | .05 | 17.7 | 25.5 | 63.8 | 10.7 |
| Bfg | 2–7 | 2.67 | 4.6 | .80 | .05 | 77.80 | 16.45 | 4.72 | .82 | 1.38 | 1.31 | 6.9 | .14 | .17 | .03 | 24.5 | 53.1 | 39.7 | 7.2 |
| Bg | 7–14 | 2.27 | 5.0 | .40 | .03 | 74.61 | 20.02 | 5.48 | .82 | 1.62 | 1.61 | 4.2 | .03 | .22 | .03 | 20.1 | 47.5 | 45.1 | 7.4 |
| C | 14+ | 2.30 | 5.2 | .33 | .01 | 72.90 | 19.89 | 5.38 | 1.04 | 2.49 | 1.77 | 2.8 | .08 | .28 | .06 | 26.2 | 47.1 | 41.0 | 11.9 |

### Thom Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aa | 0–6 | 29.39 | 4.5 | 14.67 | 1.02 | 46.28 | 19.77 | | 1.78 | 1.68 | 1.46 | 23.0 | 1.23 | .85 | .30 | 3.7 | 49.2 | 36.6 | 14.2 |
| Bh | 6–12 | 29.70 | 5.0 | 11.53 | .50 | 33.17 | 30.55 | | 2.71 | 1.55 | 2.40 | 17.7 | .28 | .22 | .03 | 25.0 | 50.5 | 35.9 | 29.6 |
| Bfh | 12–20 | 11.97 | 5.0 | 2.91 | .21 | 47.12 | 30.64 | | | 2.75 | 3.84 | 8.3 | .25 | .06 | .04 | 36.6 | 52.5 | 35.2 | 12.3 |
| C | 20+ | 7.63 | 5.1 | 2.38 | .12 | 50.71 | 30.33 | | 1.21 | 3.27 | 3.91 | 6.4 | .24 | .06 | .01 | 50.0 | 49.9 | 33.9 | 14.2 |

### Thom Gravelly Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aa | 0–6 | 16.78 | 5.1 | 9.30 | .27 | 63.47 | 17.36 | 7.65 | | .21 | 1.36 | 12.3 | 4.82 | 3.06 | .33 | 29.1 | 38.2 | 42.9 | 14.0 |
| L–H | 3–0 | 79.61 | 3.7 | 43.77 | 1.83 | 15.26 | 4.02 | 1.45 | | .21 | .54 | 94.8 | 4.65 | 7.41 | .93 | | | | |
| Ae | 0–3 | 3.22 | 4.5 | .87 | .07 | 83.18 | 13.47 | 2.40 | 1.50 | .16 | .29 | 7.9 | .30 | .17 | .06 | 55.1 | 19.2 | 62.9 | 17.9 |
| Bfh | 3–12 | 12.01 | 4.6 | 4.18 | .22 | 55.75 | 30.22 | 11.32 | 7.78 | .15 | 1.04 | 28.7 | .68 | .22 | .11 | 36.2 | 17.9 | 47.3 | 33.8 |
| Bf | 12–20 | 7.65 | 5.0 | 2.27 | .12 | 64.35 | 25.78 | 7.70 | 2.34 | .25 | 1.56 | 9.8 | .68 | .08 | .06 | 38.2 | 47.5 | 44.2 | 9.3 |
| C | 20+ | 4.36 | 5.1 | .63 | .05 | 67.25 | 26.74 | 6.25 | 1.90 | .14 | 1.70 | 4.6 | .63 | .11 | .06 | 44.0 | 61.0 | 31.8 | 7.2 |

### Thom Gravelly Silt Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L–H | 2–0 | 52.00 | 3.9 | 29.76 | 1.08 | 36.14 | 9.72 | 3.15 | | .38 | .93 | 83.5 | 2.01 | .51 | .49 | | | | |
| Ae | 0–2 | 3.78 | 3.9 | 1.24 | .07 | 81.73 | 13.67 | 3.40 | .82 | .28 | .52 | 13.0 | .14 | .11 | .06 | 40.3 | 37.2 | 54.2 | 8.6 |
| Bfh | 2–10 | 10.66 | 4.7 | 3.63 | .19 | 60.21 | 26.67 | 12.20 | 6.48 | .28 | 1.75 | 10.2 | .08 | .22 | .06 | 57.2 | 30.6 | 39.9 | 9.5 |
| Bf | 10–18 | 6.61 | 5.1 | 2.07 | .09 | 67.72 | 22.31 | 7.65 | 1.58 | .49 | 2.05 | 11.8 | .08 | .28 | .04 | 60.9 | 71.5 | 25.7 | 2.8 |
| C | 18+ | 5.30 | 5.2 | 1.20 | .06 | 64.46 | 25.13 | 7.97 | .60 | .37 | 2.96 | 5.6 | .05 | .11 | .04 | 66.7 | 65.9 | 13.0 | 1.1 |

### Thom Gravelly Sandy Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L–H | 2–0 | 56.17 | 3.6 | 35.14 | 1.03 | 34.91 | 6.65 | 1.70 | | .71 | .61 | 64.7 | 3.33 | 1.17 | .80 | | | | |
| Ae | 0–2 | 4.34 | 3.9 | 2.01 | .10 | 78.06 | 16.06 | 3.33 | .90 | .39 | .41 | 10.5 | .25 | .28 | .06 | 40.1 | 40.7 | 45.3 | 5.0 |
| Bfh$_1$ | 2–12 | 10.42 | 5.1 | 4.58 | .20 | 60.20 | 24.84 | 11.00 | 5.60 | 2.06 | 1.03 | 12.8 | .05 | .17 | .06 | 54.3 | 46.1 | 47.8 | 6.1 |
| Bfh$_2$ | 12–20 | 6.35 | 5.2 | 2.67 | .09 | 67.72 | 20.27 | 5.30 | 1.24 | 1.96 | 1.50 | 7.9 | .05 | .17 | .02 | 52.3 | 66.1 | 32.0 | 1.9 |
| C | 20+ | 2.36 | 5.4 | .52 | .03 | 74.17 | 19.72 | 3.63 | .58 | 1.52 | 1.80 | 3.2 | .11 | .28 | .04 | 66.7 | 60.2 | 32.4 | 6.4 |

### Shallo Sandy Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aa | 0–6 | 8.03 | 4.8 | 3.47 | .24 | 78.91 | 11.44 | 3.67 | | .19 | .31 | 8.9 | 1.01 | .54 | .13 | 23.8 | 60.5 | 29.1 | 11.4 |
| Aa | 0–6 | 11.27 | 4.5 | 5.41 | .27 | 74.69 | 12.73 | 3.53 | | .16 | .28 | 10.6 | 1.36 | .16 | .14 | 16.3 | 59.8 | 30.4 | 10.8 |
| Aa | 0–6 | 10.28 | 4.6 | 5.01 | .27 | 75.96 | 11.77 | 4.16 | | .14 | .34 | 11.6 | .95 | .21 | .16 | 17.4 | 60.5 | 33.1 | 10.4 |
| L–H | 2–0 | 75.56 | 3.5 | 42.97 | 1.49 | 19.29 | 1.35 | .76 | | .31 | .12 | 94.9 | 7.87 | 4.36 | 3.21 | | | | |
| Ae | 0–3 | 1.30 | 4.4 | .36 | .03 | 94.30 | 4.86 | .91 | .98 | .07 | .13 | 2.7 | .68 | .04 | .04 | 4.6 | 66.6 | 29.7 | 3.7 |
| Bfh$_1$ | 3–10 | 7.97 | 4.5 | 2.91 | .10 | 73.84 | 16.97 | 5.10 | 5.06 | .09 | .38 | 20.5 | .15 | .18 | .07 | 16.7 | 45.9 | 34.5 | 19.6 |
| Bfh$_2$ | 10–16 | 7.02 | 5.1 | 2.05 | .11 | 74.68 | 16.79 | 5.84 | 2.30 | .17 | .75 | 9.1 | .06 | .07 | .06 | 16.8 | 51.3 | 40.2 | 8.5 |
| Bf | 16–22 | 3.73 | 5.0 | 1.12 | .06 | 82.67 | 12.54 | 3.77 | 1.48 | .11 | .48 | 5.4 | .11 | .05 | .04 | 21.0 | 57.8 | 34.6 | 7.6 |
| C | 22+ | 2.15 | 4.7 | .21 | | 82.80 | 13.19 | 3.77 | 1.19 | .13 | .79 | 2.6 | .10 | .07 | .05 | 26.5 | 57.7 | 28.1 | 14.2 |

### Hebert Sandy Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aa | 0–6 | 6.26 | 4.8 | 2.92 | .19 | 85.78 | 7.74 | | | .26 | .39 | 4.1 | .72 | .23 | .09 | 3.8 | 68.2 | 28.8 | 3.0 |
| Aa | 0–2 | 15.79 | 4.1 | 6.27 | .32 | 82.66 | 2.56 | | .21 | .20 | .21 | 9.1 | 2.13 | .23 | .30 | 0.0 | 60.4 | 12.6 | 7.0 |
| Aa | 0–4 | .32 | 4.6 | .40 | .03 | 96.47 | 2.13 | | .32 | .07 | .15 | .6 | .15 | .02 | .03 | 1.0 | 77.2 | 16.1 | 6.7 |
| Bfh | 4–12 | 3.36 | 4.3 | 1.37 | .08 | 90.35 | 6.82 | | 1.92 | .11 | .31 | 5.8 | .38 | .24 | .03 | 0.9 | 73.2 | 24.4 | 2.4 |
| Bf | 12–22 | 4.27 | 4.8 | 1.28 | .08 | 85.94 | 9.52 | | 1.38 | .15 | .40 | 4.3 | .14 | .75 | .03 | 9.0 | 80.5 | 12.0 | 7.5 |
| C | 22+ | .82 | 4.9 | .17 | .03 | 92.66 | 6.45 | | .68 | .12 | .38 | 1.1 | .36 | .11 | .03 | .2 | 66.6 | 9.2 | 4.0 |

### Hebert Gravelly Sandy Loam

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aa | 0–5 | 14.08 | 4.6 | 7.13 | .50 | 67.96 | 14.43 | 3.19 | | .66 | .50 | 17.9 | 1.47 | 1.60 | .32 | 38.4 | 48.2 | 40.8 | 11.0 |
| Ae | 5–10 | 3.65 | 4.7 | 1.63 | .13 | 74.39 | 19.39 | 5.50 | .94 | .75 | 1.91 | 7.5 | .34 | .22 | .11 | 57.1 | 53.8 | 39.4 | 7.8 |
| Bfh | 10–16 | 9.16 | 5.0 | 3.43 | .17 | 63.81 | 22.66 | 5.29 | 1.22 | .71 | 1.22 | 11.3 | .13 | .14 | .08 | 27.5 | 50.4 | 42.8 | 6.8 |
| Bf | 16–22 | 3.15 | 5.1 | .63 | .05 | 71.58 | 20.84 | 4.05 | .88 | .69 | 1.10 | 6.2 | .08 | .08 | .06 | 48.4 | 32.3 | 48.3 | 9.4 |

**Table 15 continued**

| Horizon | Depth Inches | Loss on ignition % | pH | Total C % | Total N % | Total $SiO_2$ % | Total $R_2O_3$ % | Total $Fe_2O_3$ % | Free $Fe_2O_3$ % | Total CaO % | Total MgO % | Exchangeable bases m.e. /100 gm. soil | | | | Gravel % | Sand 2-.05 mm. % | Silt .05-.002 mm. % | Clay below .002 mm. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | H | Ca | Mg | K | | | | |
| | | | | | | | | | Hebert Gravelly Sandy Loam—*Concluded* | | | | | | | | | | |
| $B_{1}$ | 22–32 | 2.57 | 5.1 | .33 | .03 | 72.14 | 19.72 | 5.11 | .96 | .70 | .96 | 6.4 | .28 | .22 | .06 | 22.2 | 53.8 | 20.0 | 7.2 |
| C | 32+ | 1.80 | 5.2 | .10 | .02 | 73.43 | 18.96 | 3.66 | .68 | .87 | .96 | 5.3 | .11 | .11 | .05 | 46.7 | 60.3 | 26.8 | 3.9 |
| | | | | | | | | | Cumberland Silt Loam | | | | | | | | | | |
| Aa | 0–6 | 6.42 | 4.7 | 2.17 | .22 | 72.14 | 18.62 | 5.08 | 2.31 | .42 | .80 | 9.3 | .53 | .20 | .10 | | 29.6 | 54.1 | 9.1 |
| | 6–18 | 3.99 | 4.9 | .86 | .09 | 75.07 | 17.97 | 4.94 | 3.27 | .40 | .83 | 4.1 | .28 | .13 | .06 | | 42.9 | 48.5 | 8.6 |
| | 18–30 | 3.32 | 5.1 | .57 | .07 | 75.68 | 18.05 | 4.88 | 1.96 | .41 | .81 | 5.1 | .16 | .16 | .07 | | 44.6 | 47.2 | 8.2 |
| | 30–36 | 2.80 | 4.9 | .31 | .06 | 76.86 | 17.89 | 4.38 | 2.26 | .41 | .69 | 5.6 | .39 | .12 | .05 | 2.2 | 37.4 | 50.2 | 12.4 |

In physical composition the soils range from loamy sand to clay (Figure 20). In general, soils having more than 27 per cent clay have moderately slow to slow water movement through the profile In some of the sandier soils, the movement of water may be inhibited by a compact layer in the profile or by a layer having a high silt content. A fairly high silt content seems to be common in many soils of the area. Soils with more than 27 per cent clay require careful management. They should be plowed and cultivated when moisture conditions are optimum in order to preserve the structure. Otherwise the soil will puddle when wet and bake hard when dry and it is difficult to establish good tilth.

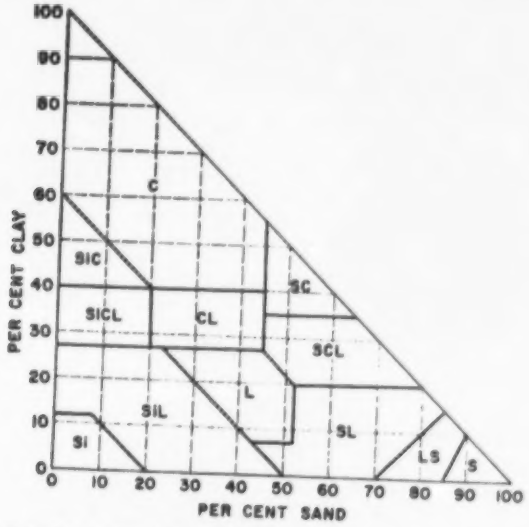


FIGURE 20. Percentages of clay and sand in the main textural classes of soils; the remainder of each class is silt. *See* Toogood, J. A., Can. J. Soil Sci. 38:54-55, 1958. The limits between classes are as in *Soil Survey Manual*, U.S.D.A. Handbook 18, 1951.

The analyses cover only a few types in the surveyed area. Chemical and physical analyses of other soils similar to those found in the Island have been published in the reports for various other areas of the province, particularly those for Pictou, Hants, Antigonish and Colchester counties.

## Available Nutrients

The supply of available major nutrients in the soils (Table 16) is important in crop production. In general, the supply tends to increase with depth in the profile as a natural result of leaching. Availability of nutrients may be high in undisturbed surface layers where organic matter acts as an exchange complex. There is considerable variation in the supply of available elements between soils of the same series.

Available calcium is usually higher in the finer-textured soils such as the Falmouth, Queens, Millbrook and Kingsville series. The medium-textured Kirkhill and Diligence soils are somewhat better supplied with calcium than the moderately coarse textured Westbrook, Shulie and Thom soils. The water-deposited Hebert and Cumberland soils have moderate amounts of available calcium because they receive additions from the drainage water from higher

elevations. The Falmouth and Kingsville soils have more available magnesium than the other soils. The Queens, Millbrook and Diligence soils have moderate amounts, particularly in the lower horizons. The coarser-textured soils have lesser amounts and may require fertilization with this element for certain crops.

**Table 16.—Available Nutrients in Pounds per Acre in the Various Soil Profiles**

| Series | Horizon | Depth Inches | Ca | Mg | K | P |
|---|---|---|---|---|---|---|
| Falmouth Clay Loam | L-H[1] | 2–0 | 180 | 89 | 9 | 9 |
| | Ae | 0–2 | 224 | 77 | 29 | 4 |
| | Bfh | 2–10 | 1172 | 312 | 84 | 6 |
| | Bf | 10–20 | 756 | 197 | 84 | 6 |
| | C | 20+ | 1280 | 350 | 100 | 18 |
| Queens Silt Loam | L-H | 5–0 | 216 | 180 | 151 | 8 |
| | Ae | 0–2 | 256 | 41 | 70 | 4 |
| | Bfg | 2–10 | 76 | 53 | 148 | 2 |
| | Bg | 10–20 | 76 | 41 | 94 | 0 |
| | C | 20+ | 320 | 113 | 78 | 0 |
| Queens Loam | L-H | 2–0 | 160 | 103 | 61 | 21 |
| | Ae | 0–5 | 336 | 91 | 42 | 4 |
| | Bfg | 5–10 | 336 | 65 | 25 | 2 |
| | Bg | 10–20 | 1968 | 230 | 87 | 126 |
| | C | 20+ | 3128 | 182 | 100 | 320 |
| Kingsville Clay Loam | L-H | 2–0 | 109 | 173 | 27 | 12 |
| | Aeg | 0–3 | 42 | 50 | 58 | 6 |
| | Bg | 3–9 | 112 | 146 | 75 | 2 |
| | Bg | 9–21 | 492 | 291 | 119 | 0 |
| | $C_1$ | 21–36 | 2308 | 946 | 148 | 286 |
| | $C_2$ | 36+ | 3684 | 890 | 183 | 234 |
| Woodbourne Clay Loam | L-H | 2–0 | 295 | 93 | 142 | 10 |
| | Ae | 0–2 | 12 | 34 | 31 | 4 |
| | Bfh | 2–10 | 12 | 26 | 62 | 0 |
| | Bf | 10–18 | 12 | 19 | 41 | 2 |
| | C | 18+ | 12 | 43 | 101 | 44 |
| Millbrook Silt Loam | L-H | 3–0 | 98 | 71 | 69 | 11 |
| | Ae | 0–3 | 260 | 77 | 25 | 6 |
| | $Bfg_1$ | 3–8 | 228 | 74 | 50 | 2 |
| | $Bfg_2$ | 8–15 | 832 | 269 | 117 | 6 |
| | C | 15+ | 1588 | 521 | 92 | 208 |
| Kirkhill Silt Loam | L-H | 2–0 | 95 | 43 | 47 | 22 |
| | Ae | 0–2 | 116 | 36 | 86 | 7 |
| | Bfh | 2–10 | 132 | 53 | 156 | 11 |
| | Bf | 10–18 | 100 | 29 | 101 | 7 |
| | C | 18+ | 104 | 118 | 109 | 31 |
| Diligence Clay Loam | L-H | 2–0 | 159 | 134 | 33 | 30 |
| | Ae | 0–3 | 128 | 86 | 4 | 14 |
| | Bfg | 3–10 | 72 | 86 | 42 | 2 |
| | Bg | 10–17 | 72 | 115 | 171 | 4 |
| | C | 17+ | 72 | 113 | 186 | 2 |
| Westbrook Sandy Loam | L-H | 2–0 | 390 | 87 | 44 | 8 |
| | Ae | 0–3 | 88 | 14 | 39 | 7 |
| | Bfh | 3–10 | 124 | 17 | 55 | 10 |
| | Bf | 10–20 | 56 | 34 | 55 | 3 |
| | C | 20+ | 68 | 41 | 70 | 33 |
| Westbrook Sandy Loam | L-H | 2–0 | 335 | 87 | 75 | 20 |
| | Ae | 0–1 | 88 | 53 | 39 | 6 |
| | Bfh | 1–5 | 56 | 41 | 70 | 0 |
| | $Bf_1$ | 5–18 | 32 | 60 | 47 | 6 |
| | $Bf_2$ | 18–26 | 100 | 7 | 47 | 6 |
| | C | 26+ | 32 | 0 | 31 | 92 |
| Westbrook Gravelly Sandy Loam | Aa | 0–6 | 272 | 129 | 102 | 8 |
| | Ae | 0–3 | 144 | 50 | 16 | 14 |
| | $Bfh_1$ | 3–14 | 88 | 70 | 69 | 8 |
| | $Bfh_2$ | 14–22 | 112 | 43 | 34 | 0 |
| | C | 22+ | 100 | 26 | 42 | 2 |

**Table 16 continued**

| Series | Horizon | Depth Inches | Ca | Mg | K | P |
|---|---|---|---|---|---|---|
| Debert Silt Loam | L-H | 2–0 | 62 | 19 | 47 | 8 |
| | Ae | 0–2 | 20 | 53 | 39 | 2 |
| | Bfg | 2–7 | 56 | 41 | 23 | 2 |
| | Bg | 7–14 | 12 | 53 | 23 | 20 |
| | C | 14+ | 32 | 67 | 46 | 122 |
| Thom Loam | Aa | 0–6 | 492 | 204 | 462 | 56 |
| | Bh | 6–12 | 112 | 53 | 23 | 4 |
| | Bfh | 12–20 | 100 | 14 | 30 | 12 |
| | C | 20+ | 96 | 14 | 4 | 30 |
| Thom Gravelly Loam | L-H | 2–0 | 179 | 172 | 70 | 6 |
| | Ae | 0–3 | 120 | 41 | 47 | 4 |
| | Bfh | 3–12 | 32 | 53 | 86 | 2 |
| | Bf | 12–20 | 32 | 19 | 47 | 4 |
| | C | 20+ | 12 | 26 | 47 | 16 |
| Thom Gravelly Silt Loam | L-H | 2–0 | 78 | 11 | 36 | 21 |
| | Ae | 0–2 | 56 | 26 | 47 | 4 |
| | Bfh | 2–10 | 32 | 53 | 47 | 0 |
| | Bf | 10–18 | 32 | 67 | 31 | 2 |
| | C | 18+ | 20 | 26 | 31 | 4 |
| Thom Gravelly Sandy Loam | L-H | 2–0 | 128 | 26 | 68 | 15 |
| | Ae | 0–2 | 100 | 67 | 62 | 2 |
| | $Bfh_1$ | 2–12 | 20 | 41 | 47 | 2 |
| | $Bfh_2$ | 12–20 | 20 | 41 | 16 | 0 |
| | C | 20+ | 44 | 67 | 31 | 14 |
| Shulie Sandy Loam | L-H | 2–0 | 300 | 97 | 242 | 39 |
| | Ae | 0–3 | 32 | 10 | 31 | 40 |
| | $Bfh_1$ | 3–10 | 60 | 43 | 62 | 11 |
| | $Bfh_2$ | 10–16 | 24 | 17 | 39 | 7 |
| | Bf | 16–22 | 44 | 12 | 39 | 5 |
| | C | 22+ | 40 | 17 | 47 | 76 |
| Hebert Sandy Loam | Aa | 0–2 | 852 | 55 | 239 | 4 |
| | Ae | 0–4 | 60 | 5 | 19 | 0 |
| | Bfh | 4–12 | 140 | 58 | 25 | 0 |
| | Bf | 12–22 | 52 | 180 | 21 | 0 |
| | C | 22+ | 144 | 26 | 16 | 2 |
| Hebert Gravelly Sandy Loam | Aa | 0–5 | 56 | 37 | 24 | 26 |
| | Ae | 5–10 | 136 | 53 | 8 | 4 |
| | Bfh | 10–16 | 52 | 34 | 6 | 2 |
| | $Bf_1$ | 16–22 | 32 | 19 | 5 | 4 |
| | $Bf_2$ | 22–32 | 112 | 53 | 5 | 8 |
| | C | 32+ | 44 | 26 | 4 | 10 |
| Cumberland Silt Loam | Aa | 0–6 | 212 | 48 | 83 | 16 |
| | | 6–18 | 112 | 31 | 48 | 17 |
| | | 18–30 | 64 | 38 | 56 | 21 |
| | | 30–36 | 156 | 20 | 44 | 11 |
| | | *Surface Samples* | | | | |
| Queens Loam | Aa | 0–6 | 2152 | 172 | 90 | 4 |
| Woodbourne Clay Loam | Aa | 0–6 | 536 | 96 | 83 | 8 |
| Diligence Clay Loam | Aa | 0–6 | 1400 | 290 | 142 | 12 |
| Thom Gravelly Loam | Aa | 0–6 | 1952 | 732 | 257 | 8 |
| Shulie Sandy Loam | Aa | 0–6 | 764 | 130 | 101 | 38 |
| | Aa | 0–6 | 544 | 38 | 109 | 62 |
| Hebert Sandy | Aa | 0–6 | 380 | 50 | 125 | 70 |
| | Aa | 0–6 | 288 | 55 | 76 | 18 |

[1]Available nutrients were calculated on the basis of 2,000,000 pounds of soil per acre to six inches deep, except, that for the L-H horizons they were calculated on the basis of 193,000 pounds per acre.

The availability of potassium and phosphorus varies considerably with the organic matter content and pH of the soil. Available phosphorus is generally low except in the lower horizons of the Queens and Kingsville soils.

The acreages of the various soil series in each county are given in Table 17, and also the acreage of each topographic and stoniness phase of each series.

**Table 17.—Acreages of Soil Series and Phases in Various Counties, and Percentages of County and Total Areas**

| Phase | Inverness | | Cape Breton | | Richmond | | Victoria | | Acres total | Per cent of Island area |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | | |
| **Falmouth Series** | | | | | | | | | | |
| A-1 | 31.4 | .00 | | | | | | | 31.4 | .00 |
| B-1 | 1,195.5 | .12 | | | | | | | 1,195.5 | .05 |
| B-2 | 19.8 | .00 | 99.6 | .02 | | | | | 119.4 | .00 |
| C-1 | 4,060.8 | .42 | 151.4 | .02 | | | 689.5 | .10 | 4,901.7 | .19 |
| C-2 | 3,948.8 | .42 | 605.8 | .09 | | | 3,168.4 | .44 | 7,723.0 | .29 |
| D-1 | 1,503.6 | .17 | | | | | | | 1,503.6 | .06 |
| D-2 | 916.5 | .10 | | | | | | | 916.5 | .04 |
| Total | 11,766.4 | 1.23 | 856.8 | .13 | | | 3,857.9 | .54 | 16,481.1 | .63 |
| **Woodbourne Series** | | | | | | | | | | |
| B-1 | 135.0 | .01 | | | | | | | 135.0 | .01 |
| B-2 | 630.4 | .07 | | | 5,063.7 | 1.59 | 709.4 | .10 | 6,403.5 | .24 |
| B-3 | 28.2 | .00 | | | | | | | 28.2 | .00 |
| C-2 | 45,333.1 | 4.72 | | | 15,119.3 | 4.75 | | | 60,452.4 | 2.29 |
| C-3 | 1,397.8 | .15 | | | 5,649.3 | 1.78 | | | 7,047.1 | .26 |
| D-2 | 3,255.7 | .34 | | | | | | | 3,255.7 | .12 |
| D-4 | | | | | 99.6 | .03 | | | 99.6 | .01 |
| Total | 50,780.2 | 5.29 | | | 25,931.9 | 8.15 | 709.4 | .10 | 77,421.5 | 2.93 |
| **Westbrook Series** | | | | | | | | | | |
| B-1 | | | 3,887.9 | .61 | | | | | 3,877.9 | .15 |
| B-2 | 2,603.8 | .28 | 984.4 | .15 | 326.7 | .10 | 884.8 | .12 | 4,889.7 | .18 |
| C-1 | | | 849.0 | .13 | | | 83.7 | .01 | 932.7 | .03 |
| C-2 | 5,176.4 | .54 | 24,714.3 | 3.86 | 3,860.5 | 1.21 | 11,119.5 | 1.55 | 44,870.7 | 1.74 |
| C-3 | 7,791.3 | .81 | 414.5 | .06 | | | | | 8,205.8 | .28 |
| D-2 | | | 3,881.9 | .61 | | | 2,925.4 | .41 | 6,807.3 | .26 |
| D-3 | 18,080.6 | 1.88 | 275.0 | .04 | | | 27,966.8 | 3.89 | 46,322.4 | 1.76 |
| E-3 | 2,087.7 | .22 | | | | | 5,696.5 | .79 | 7,747.2 | .29 |
| Total | 35,829.8 | 3.73 | 34,997.0 | 5.46 | 4,187.2 | 1.31 | 48,639.7 | 6.77 | 122,553.7 | 4.69 |
| **Pugwash Series** | | | | | | | | | | |
| B-1 | 709.1 | .07 | | | | | | | 709.1 | .03 |
| B-2 | 107.5 | .00 | | | | | | | 107.5 | .00 |
| Total | 816.6 | .08 | | | | | | | 816.6 | .03 |

### Shulie Series

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A-1 | 11.5 | .00 | | | | | | | 11.5 | .00 |
| B-1 | | | 546.0 | .08 | | | | | 546.0 | .02 |
| B-2 | 1,043.8 | .11 | 20,820.3 | 3.25 | | | 63.7 | .01 | 21,927.8 | .83 |
| B-3 | 598.4 | .06 | 24,746.2 | 3.87 | 1,294.8 | .41 | | | 26,639.4 | 1.01 |
| B-4 | 155.5 | .02 | | | | | | | 155.5 | .01 |
| C-1 | | | 669.6 | .10 | | | | | 669.6 | .02 |
| C-2 | 2,482.6 | .26 | 16,332.7 | 2.55 | | | 2,738.0 | .38 | 21,553.3 | .82 |
| C-3 | 4,323.8 | .45 | 29,493.0 | 4.61 | 1,613.5 | .51 | 16,093.6 | 2.24 | 51,523.9 | 1.95 |
| D-2 | 931.8 | .10 | | | | | | | 931.8 | .03 |
| D-3 | 18,886.4 | 1.96 | | | | | 27.9 | .00 | 18,914.3 | .72 |
| Total | 28,433.8 | 2.96 | 92,607.8 | 14.46 | 2,908.3 | .92 | 18,923.2 | 2.63 | 142,873.1 | 5.41 |

### Thom Series

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B-2 | | | 641.7 | .10 | 1,681.2 | .53 | | | 2,332.9 | .09 |
| B-3 | 673.3 | .07 | 28,096.3 | 4.39 | 15,488.0 | 4.85 | | | 44,257.6 | 1.68 |
| B-4 | | | | | 1,356.8 | .44 | 290.9 | .04 | 1,647.7 | .06 |
| C-1 | | | | | | | 259.1 | .04 | 259.1 | .01 |
| C-2 | 8,631.7 | .90 | 379.2 | .06 | 4,123.4 | 1.30 | | | 13,134.3 | .50 |
| C-3 | 89,194.2 | 9.29 | 167,950.1 | 26.27 | 76,548.6 | 24.05 | 2,941.3 | .41 | 336,634.2 | 12.76 |
| C-4 | | | 1,609.9 | .25 | 5,298.7 | 1.66 | | | 6,908.6 | .26 |
| D-3 | 8,109.4 | .85 | 26,543.7 | 4.15 | 3,362.5 | 1.06 | 769.2 | .11 | 38,784.8 | 1.47 |
| D-4 | | | 3,272.1 | .51 | 1,924.3 | .60 | | | 5,196.4 | .20 |
| E-3 | 18,089.0 | 1.88 | | | | | | | 18,089.0 | .68 |
| E-4 | 24,959.4 | 2.60 | | | 3,621.5 | 1.14 | | | 28,580.9 | 1.08 |
| Total | 149,657.0 | 15.59 | 288,493.0 | 35.73 | 113,540.0 | 35.63 | 4,260.5 | .60 | 495,815.5 | 18.79 |

### Kirkhill Series

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B-1 | | | 2,682.2 | .42 | | | | | 2,682.2 | .10 |
| B-2 | | | 1,351.1 | .21 | | | | | 1,351.1 | .05 |
| B-3 | | | 2,383.4 | .37 | | | | | 2,383.4 | .09 |
| C-2 | | | 6,635.9 | 1.04 | | | 1,000.4 | .14 | 7,636.3 | .29 |
| C-3 | | | 6,679.7 | 1.04 | | | | | 6,679.7 | .25 |
| D-2 | | | | | | | 203.3 | .03 | 203.3 | .01 |
| Total | | | 19,732.3 | 3.08 | | | 1,203.7 | .17 | 20,936.0 | .79 |

### Gibraltar Series

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| B-3 | | | | | | | 151.4 | .02 | 151.4 | .01 |
| B-4 | | | | | | | 817.0 | .11 | 817.0 | .03 |
| C-2 | | | | | | | 2,522.8 | .35 | 2,522.8 | .09 |
| C-3 | | | | | 39.8 | .01 | 8,373.6 | 1.17 | 8,413.4 | .32 |
| C-4 | | | | | 14,103.4 | 4.43 | 673.5 | .09 | 14,776.9 | .56 |
| Total | | | | | 14,143.2 | 4.44 | 12,538.3 | 1.74 | 26,681.5 | 1.01 |

**Table 17 continued**

| Phase | Inverness | | Cape Breton | | Richmond | | Victoria | | Acres total | Per cent of Island area |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | | |
| **Hebert Series** | | | | | | | | | | |
| A–0 | 497.9 | .05 | | | 23.9 | .01 | | | 521.8 | .02 |
| A–1 | 6,471.1 | .67 | 139.5 | .02 | 103.6 | .03 | | | 6,714.8 | .25 |
| A–2 | 183.0 | .02 | | | | | | | 183.0 | .01 |
| B–1 | 7,750.7 | .82 | 4,797.0 | .75 | 187.2 | .06 | 275.0 | .04 | 13,009.9 | .49 |
| B–2 | 3,108.4 | .32 | 6,867.4 | 1.07 | 167.3 | .05 | 1,893.1 | .26 | 12,036.2 | .46 |
| B–3 | | | 19.9 | .00 | | | 4,391.9 | .61 | 4,411.8 | .17 |
| C–1 | 2,335.4 | .24 | | | | | 115.6 | .02 | 2,451.0 | .09 |
| C–2 | 2,275.2 | .24 | 1,494.6 | .23 | | | 3,945.7 | .55 | 7,715.5 | .29 |
| C–3 | | | | | | | 8.0 | .00 | 8.0 | .00 |
| D–2 | 1,856.0 | .20 | 67.8 | .01 | | | 71.7 | .01 | 1,995.5 | .08 |
| Total | 24,478.3 | 2.56 | 13,386.3 | 2.08 | 482.0 | .15 | 10,601.0 | 1.49 | 49,047.5 | 1.86 |
| **Torbrook Series** | | | | | | | | | | |
| B–1 | | | 1,398.8 | .22 | | | | | 1,398.8 | .06 |
| C–1 | | | 1,925.0 | .30 | | | | | 1,925.0 | .07 |
| C–2 | | | 3,395.6 | .53 | | | | | 3,395.6 | .13 |
| Total | | | 6,719.4 | 1.05 | | | | | 6,719.4 | .26 |
| **Canning Series** | | | | | | | | | | |
| A–0 | 258.6 | .03 | | | | | | | 258.6 | .01 |
| B–0 | 247.0 | .03 | | | | | | | 247.0 | .01 |
| B–1 | 3,152.0 | .33 | | | | | | | 3,152.0 | .12 |
| C–1 | 5,969.9 | .62 | | | | | | | 5,969.2 | .23 |
| C–2 | 131.2 | .01 | | | | | | | 131.2 | .00 |
| Total | 9,758.7 | 1.02 | | | | | | | 9,758.7 | .37 |
| **Cumberland Series** | | | | | | | | | | |
| A–0 | 8,687.4 | .91 | 1,223.6 | .20 | 255.0 | .08 | | | 10,166.0 | .38 |
| A–1 | 497.9 | .05 | 119.5 | .02 | | | | | 617.4 | .02 |
| B–1 | | | | | | | 2,263.7 | .32 | 2,263.7 | .09 |
| B–2 | | | | | | | 1,024.3 | .14 | 1,024.3 | .04 |
| Total | 9,185.3 | .96 | 1,343.1 | .22 | 255.0 | .08 | 3,288.0 | .46 | 14,071.4 | .53 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Digby Series** | | | | | | | | | | |
| B-1 | 79.4 | .01 | | | | | | | 79.4 | .00 |
| B-2 | 645.1 | .07 | | | | | | | 645.1 | .02 |
| C-1 | 51.8 | .00 | | | | | | | 51.8 | .00 |
| C-2 | 450.6 | .05 | | | | | | | 450.6 | .02 |
| D-2 | 183.0 | .02 | | | | | | | 183.0 | .01 |
| Total | 1,409.9 | .15 | | | | | | | 1,409.9 | .05 |
| **Queens Series** | | | | | | | | | | |
| A-1 | 35.8 | .00 | | | | | | | 35.8 | .00 |
| A-2 | 394.3 | .04 | | | | | | | 394.3 | .02 |
| B-1 | 4,893.5 | .51 | 458.4 | .07 | | | 171.4 | .02 | 5,523.3 | .21 |
| B-2 | 34,675.8 | 3.61 | | | 9,676.8 | 2.87 | 3,798.2 | .53 | 48,150.8 | 1.83 |
| B-3 | 3,227.5 | .34 | | | 3,443.2 | 1.25 | | | 6,670.7 | .25 |
| C-1 | 5,591.0 | .58 | | | | | | | 5,591.0 | .21 |
| C-2 | 24,648.3 | 2.57 | | | 4,717.1 | 1.48 | 15,324.4 | 2.13 | 44,689.8 | 1.69 |
| C-3 | 3,733.8 | .39 | | | | | | | 3,733.8 | .14 |
| D-2 | 250.9 | .03 | | | | | | | 250.9 | .01 |
| Total | 77,450.9 | 8.07 | 458.4 | .07 | 17,837.1 | 5.60 | 19,294.0 | 2.68 | 115,040.4 | 4.36 |
| **Millbrook Series** | | | | | | | | | | |
| B-2 | 5,268.5 | .55 | 1,215.6 | .19 | 15,744.8 | 4.94 | 171.3 | .03 | 22,400.2 | .85 |
| B-3 | 10,820.5 | 1.13 | | | 2,908.3 | .91 | | | 13,728.8 | .52 |
| C-2 | 42,120.2 | 4.39 | 7,883.3 | 1.23 | 8,039.7 | 2.53 | 12,331.3 | 1.72 | 70,374.5 | 2.67 |
| C-3 | 1,011.2 | .11 | | | 11,553.6 | 3.63 | 271.0 | .04 | 12,835.8 | .48 |
| D-2 | 322.5 | .03 | 346.8 | .05 | | | 685.5 | .09 | 1,354.8 | .05 |
| Total | 59,542.9 | 6.21 | 9,445.7 | 1.47 | 38,246.4 | 12.01 | 13,459.1 | 1.88 | 120,694.1 | 4.57 |
| **Diligence Series** | | | | | | | | | | |
| B-1 | | | 2,758.0 | .43 | | | | | 2,758.0 | .11 |
| B-2 | 147.2 | .02 | 3,977.5 | .62 | 6,031.8 | 1.90 | | | 10,156.5 | .38 |
| B-3 | 5,710.7 | .59 | 171.4 | .13 | 8,115.4 | 2.55 | | | 13,997.5 | .53 |
| C-2 | 11,041.3 | 1.15 | | | 3,960.1 | 1.24 | 896.8 | .13 | 15,898.2 | .60 |
| C-3 | | | | | 1,207.1 | .38 | 255.1 | .04 | 1,462.2 | .06 |
| D-2 | 4,491.5 | .47 | | | | | 1,410.9 | .20 | 5,902.4 | .22 |
| Total | 21,390.7 | 2.23 | 6,906.9 | 1.18 | 19,314.4 | 6.07 | 2,562.8 | .37 | 50,174.8 | 1.90 |
| **Mira Series** | | | | | | | | | | |
| A-2 | | | | | 23.9 | .01 | | | 23.9 | .00 |
| A-3 | | | | | 410.4 | .13 | | | 410.4 | .02 |
| A-4 | | | | | 39.8 | .01 | | | 39.8 | .00 |
| B-2 | | | 1,813.4 | .28 | 2,370.5 | .74 | | | 4,183.9 | .16 |
| B-3 | | | 32,105.2 | 4.92 | 3,466.1 | 1.09 | | | 35,571.3 | 1.35 |
| B-4 | | | 4,142.8 | .65 | 27.9 | .01 | | | 4,170.7 | .16 |
| C-3 | | | 239.1 | .04 | 1,000.0 | .31 | 3,383.7 | .45 | 4,622.8 | .17 |
| Total | | | 38,300.5 | 5.89 | 7,338.6 | 2.30 | 3,383.7 | .45 | 49,022.8 | 1.86 |

**Table 17 continued**

| Phase | Inverness | | Cape Breton | | Richmond | | Victoria | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres total | Per cent of Island area |
| **Debert Series** | | | | | | | | | | |
| B-1 | | | 3,188.4 | .50 | | | | | 3,188.4 | .12 |
| B-2 | 693.1 | .08 | 4,081.2 | .64 | 1,681.2 | .53 | 709.4 | .10 | 7,164.9 | .27 |
| B-3 | 31.4 | .00 | | | | | | | 31.4 | .00 |
| C-2 | | | 4,878.3 | .76 | | | 3,794.2 | .53 | 8,672.5 | .33 |
| C-3 | | | 609.8 | .09 | | | 6,662.4 | .93 | 7,272.2 | .28 |
| Total | 724.5 | .08 | 12,757.7 | 1.99 | 1,681.2 | .53 | 11,166.0 | 1.56 | 26,329.4 | 1.00 |
| **Springhill Series** | | | | | | | | | | |
| A-2 | | | 39.9 | .01 | | | | | 39.9 | .00 |
| B-1 | | | 6,189.6 | .97 | | | | | 6,189.6 | .23 |
| B-2 | 3,072.6 | .32 | 46,455.9 | 7.26 | | | 1,355.1 | .19 | 50,883.6 | 1.93 |
| B-3 | 673.3 | .08 | 14,305.1 | 2.24 | | | 1,088.0 | .15 | 16,066.4 | .61 |
| B-4 | 206.7 | .02 | | | | | | | 206.7 | .01 |
| C-1 | 151.1 | .01 | | | | | | | 151.1 | .01 |
| C-2 | 199.0 | .02 | 123.5 | .02 | | | 685.5 | .10 | 1,008.0 | .04 |
| C-3 | | | 7.9 | .00 | | | 8,636.6 | .75 | 8,644.5 | .32 |
| 33 | | | | | | | | | | |
| Total | 4,302.7 | .45 | 67,121.9 | 10.50 | | | 11,765.2 | 1.19 | 83,189.8 | 3.15 |
| **Comeau Series** | | | | | | | | | | |
| A-1 | 187.5 | .02 | | | | | | | 187.5 | .01 |
| A-2 | | | | | | | 108.8 | .01 | 108.8 | .01 |
| B-1 | 119.7 | .01 | 59.8 | .01 | | | 31.9 | .00 | 211.4 | .01 |
| B-2 | 35.8 | .00 | 71.7 | .01 | | | 249.9 | .05 | 357.4 | .01 |
| B-3 | | | 322.8 | .05 | | | 19.9 | .00 | 342.7 | .01 |
| Total | 343.0 | .03 | 454.3 | .07 | | | 410.5 | .06 | 1,207.8 | .05 |
| **Bridgeville Series** | | | | | | | | | | |
| A-0 | 1,753.6 | .18 | 107.6 | .02 | 127.5 | .04 | 44.8 | .00 | 2,033.5 | .08 |
| A-1 | | | | | | | 51.2 | .00 | 51.2 | .00 |
| B-1 | | | | | | | 350.5 | .05 | 350.5 | .01 |
| Total | 1,753.6 | .18 | 107.6 | .02 | 127.5 | .04 | 446.5 | .05 | 2,435.2 | .09 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Kingsport Series** | | | | | | | | | | |
| A-0 | 510.1 | .05 | | | | | | | 510.1 | .02 |
| A-1 | 478.1 | .05 | | | | | | | 478.1 | .02 |
| B-0 | 11.5 | .00 | | | | | | | 11.5 | .00 |
| Total | 999.7 | .10 | | | | | | | 999.7 | .04 |
| **Bayswater Series** | | | | | | | | | | |
| B-2 | | | | | | | 267.0 | .04 | 267.0 | .01 |
| B-3 | | | | | | | 175.4 | .02 | 175.4 | .01 |
| B-4 | | | | | 637.4 | .20 | | | 637.4 | .02 |
| C-2 | | | | | | | 3,104.7 | .43 | 3,104.7 | .12 |
| C-3 | | | | | | | 2,188.0 | .30 | 2,188.0 | .08 |
| D-3 | | | | | | | 155.5 | .02 | 155.5 | .01 |
| Total | | | | | 637.4 | .20 | 5,890.6 | .81 | 6,528.0 | .25 |
| **Kingsville Series** | | | | | | | | | | |
| A-0 | 633.6 | .07 | | | 91.6 | .00 | | | 725.2 | .03 |
| A-1 | 159.4 | .01 | | | | | | | 159.4 | .00 |
| A-2 | 3,144.3 | .33 | 19.9 | .00 | 5,266.8 | 1.65 | | | 8,431.0 | .32 |
| A-3 | | | | | 737.0 | .23 | | | 737.0 | .03 |
| B-1 | 5,758.7 | .60 | | | | | 1,833.3 | .26 | 7,592.0 | .29 |
| B-2 | 18,387.9 | 1.92 | 87.7 | .02 | 10,991.8 | 3.45 | 4,830.5 | .67 | 34,297.9 | 1.30 |
| B-3 | 199.0 | .02 | | | 4,278.8 | 1.34 | | | 4,477.8 | .17 |
| Total | 28,282.9 | 2.95 | 107.6 | .02 | 21,366.0 | 6.70 | 6,663.8 | 1.03 | 56,420.3 | 2.14 |
| **Joggins Series** | | | | | | | | | | |
| A-1 | | | 61.7 | .01 | | | | | 61.7 | .00 |
| A-3 | | | | | 83.7 | .03 | | | 83.7 | .00 |
| B-1 | | | 175.4 | .03 | | | 151.4 | .02 | 326.8 | .02 |
| B-2 | 529.9 | .06 | 55.8 | .01 | 183.3 | .06 | | | 769.0 | .03 |
| B-3 | | | | | 199.2 | .06 | | | 199.2 | .01 |
| Total | 529.9 | .06 | 292.9 | .05 | 466.2 | .15 | 151.4 | .02 | 1,440.4 | .06 |
| **Masstown Series** | | | | | | | | | | |
| A-1 | | | 19.9 | .00 | | | | | 19.9 | .00 |
| A-2 | | | 19.9 | .00 | 1,422.3 | .45 | | | 1,442.2 | .05 |
| B-2 | | | 223.2 | .03 | | | 542.1 | .08 | 765.3 | .03 |
| B-3 | 131.2 | .01 | | | | | | | 131.2 | .00 |
| C-2 | | | | | | | 147.5 | .02 | 147.5 | .01 |
| Total | 131.2 | .01 | 263.0 | .03 | 1,422.3 | .45 | 689.6 | .10 | 2,506.1 | .09 |

**Table 17 continued**

| Phase | Inverness | | Cape Breton | | Richmond | | Victoria | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres | Per cent of county | Acres total | Per cent of Island area |
| **Millar Series** | | | | | | | | | | |
| A-0 | 3,865.8 | .40 | 1,100.0 | .17 | 517.9 | .16 | 172.8 | .03 | 5,656.5 | .21 |
| A-1 | | | 470.6 | .07 | | | 23.9 | .00 | 494.5 | .02 |
| A-2 | 91.0 | .01 | 80.6 | .01 | | | | | 171.6 | .01 |
| B-1 | | | | | | | 317.4 | .04 | 317.4 | .01 |
| Total | 3,956.8 | .41 | 1,651.2 | .25 | 517.9 | .16 | 514.1 | .06 | 6,640.0 | .25 |
| **Aspotogan Series** | | | | | | | | | | |
| A-4 | | | | | 649.4 | .20 | | | 649.4 | .02 |
| B-3 | | | | | | | 99.6 | .01 | 99.6 | .01 |
| B-4 | | | | | 856.6 | .27 | | | 856.6 | .03 |
| Total | | | | | 1,506.0 | 47 | 99.6 | .01 | 1,605.6 | .06 |
| **Economy Series** | | | | | | | | | | |
| A-1 | | | 701.4 | .11 | | | | | 701.4 | .03 |
| A-2 | | | 24,132.4 | 3.77 | | | | | 24,132.4 | .91 |
| A-3 | | | 2,602.6 | .41 | 366.5 | .12 | | | 2,969.1 | .11 |
| A-4 | | | | | 55.8 | .02 | | | 55.8 | .00 |
| B-1 | | | 79.7 | .01 | | | | | 79.7 | .00 |
| B-2 | 2,869.1 | .30 | 1,008.3 | .16 | | | 59.8 | .01 | 3,937.2 | .15 |
| B-3 | | | 633.7 | .10 | | | 573.9 | .08 | 1,207.6 | .05 |
| B-4 | 99.2 | .01 | | | | | | | 99.2 | .01 |
| Total | 2,968.3 | .31 | 29,158.1 | 4.56 | 422.3 | .14 | 633.7 | .00 | 33,182.4 | 1.26 |
| **Arichat Series** | | | | | | | | | | |
| A-2 | | | 27.9 | .00 | | | | | 27.9 | .00 |
| A-3 | | | 2,297.5 | .36 | 11,653.2 | 3.66 | | | 13,950.5 | .55 |
| A-4 | | | | | 3,868.5 | 1.22 | | | 3,868.5 | .15 |
| B-2 | | | 79.7 | .01 | | | | | 79.7 | .00 |
| B-3 | | | 9,263.3 | 1.45 | 490.0 | .15 | | | 9,753.3 | .37 |
| B-4 | | | 4,991.7 | .78 | 259.0 | .08 | | | 5,250.7 | .20 |
| Total | | | 16,660.1 | 2.60 | 16,270.7 | 5.11 | | | 32,930.8 | 1.25 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Meteghan Series | | | | | |
| A-0 | 725.0 | .08 | | | | | 83.2 | .01 | 808.2 | .03 |
| A-1 | | | 107.6 | .02 | | | | | 107.6 | .00 |
| A-2 | 124.0 | .01 | 67.7 | .01 | | | | | 191.7 | .01 |
| B-2 | | | | | | | 64.3 | .01 | 64.3 | .00 |
| Total | 849.0 | .09 | 175.3 | .03 | | | 147.5 | .02 | 1,171.8 | .04 |
| | | | | | Miscellaneous Soils | | | | | |
| Peat | 15,289.0 | 1.59 | 24,976.7 | 3.90 | 14,525.7 | 4.60 | 7,867.4 | 1.11 | 62,658.8 | 2.38 |
| Coastal Beach | 889.6 | .09 | 1,296.3 | .20 | 1,127.5 | .35 | 1,251.5 | .17 | 4,564.9 | .17 |
| Salt Marsh | 585.6 | .06 | 99.6 | .02 | | | 191.3 | .03 | 876.5 | .03 |
| Rough Mountain Land | 401,431.0 | 41.84 | | | | | 518,244.3 | 72.18 | 919,675.3 | 34.85 |
| Mine Dump | | | 183.4 | .03 | | | 805.1 | .11 | 988.5 | .04 |
| Lakes and Rivers | 15,980.8 | 1.67 | 31,215.4 | 4.91 | 14,123.3 | 4.44 | 11,593.9 | 1.61 | 72,913.4 | 2.76 |
| Total | 434,176.0 | 45.25 | 57,771.4 | 9.06 | 29,776.5 | 9.39 | 539,953.5 | 75.21 | 1,061,677.4 | 40.23 |
| TOTAL | 959,518.1 | 100.00 | 639,768.2 | 100.00 | 318,243.1 | 100.00 | 721,353.3 | 100.00 | 2,638,882.7 | 100.00 |

## SUMMARY

Cape Breton Island covers an area of about 4,123 square miles, or 2,638,880 acres. In the early years of its history the Island was a base for fishing fleets from Europe. For many years it was alternately under French and British rule. Since 1820 it has been part of Nova Scotia. The first permanent agricultural settlement was begun about 1786.

The economy of the Island depends largely on huge coal deposits and an associated steel industry at Sydney. The concentration of population in the Sydney area provides a market for agricultural products.

The population of the Island has increased steadily since 1871. Most of this increase has occurred in Cape Breton County, and the populations of the other counties have declined slightly. The area is adequately supplied with roads and railways. There are several fine harbors along the coast.

The Island has a humid temperate climate with a mean annual temperature of about 40° F. The frost-free season ranges from about 60 days in some of the interior valleys to 156 days along the coast.

The soil parent materials are glacial till and glaciofluvial deposits derived from sandstones, shales and metamorphic rocks. The textures range from sand to clay. The well-drained soils (37 per cent of the area) have well-developed Podzol profiles. Soil with imperfect drainage because of the parent material or topographic characteristics (17 per cent) have mottling or gleying in the lower part of the profile. In poorly drained areas (5 per cent) the soils are strongly gleyed in all horizons and belong to the great group of Eluviated Gleysols. An abundance of rivers and streams give adequate surface drainage to the Island.

The landscape of the Island has strong relief. Gently undulating to rolling lowland areas are bordered by steeply sloping hillsides of an upland plateau. Elevations range from sea level to about 1,100 feet. Much of the Island is forested and there are about 2,700 square miles of productive forest. The main trees are white spruce, red spruce, balsam fir and birch.

The fine-textured soils occupy about 16 per cent of the Island, medium-textured soils about 2 per cent, moderately coarse textured soils about 38 per cent and coarse-textured soils about 3 per cent. The rest are miscellaneous soils, including rough mountain land, salt marsh, peat and coastal beach.

The soils of the area are mapped as series according to the characteristics they exhibited in a vertical section, or profile. The characteristics of each soil series are described in detail in the report. A soil key shows the relation between the kind of parent material and the order, great soil group and subgroup to which each soil belongs.

About 12 per cent of the Island is occupied by 1,975 farms, about 15 per cent of the farm land being improved. There is a wide range in the size of the farms and in the improved area per farm. About 70 per cent of the improved land is used for field crops and about 80 to 85 per cent of this for hay. Cattle, sheep and poultry are the most important livestock, Inverness County being the leading sheep-raising area of the province.

Nearly 30 per cent of the farms are classed as commercial crop and livestock farms. The remainder carry on mixed farming, fishing–farming or lumbering–farming operations.

Only about 26 per cent of the land area is suitable for agriculture other than rough pasture. About 2 per cent is good land with slight to moderate limitations that can be corrected with simple practices. About 19 per cent is moderately good land that requires more involved management practices such as drainage and erosion control. The remaining 5 per cent is severely limited in use by natural features of slope wetness or droughtiness, and the choice of crops is limited. The rest of the land is best suited to rough pasture or forest.

Some areas of the soils could be developed to a greater extent than they are at present, but other areas should be allowed to revert to forest.

All of the soils are acid in reaction and need liming for best results in crop production. Fertilizers are needed to obtain good yields, and in the coarser-textured soils a fairly high level of organic matter is needed for desirable moisture relationships.

## GLOSSARY

*Aeration*—The process by which air and other gases in the soil are renewed. The rate of aeration depends largely on the size and number of soil pores and the amount of water in these pores. A well-aerated soil is one in which gases are available to growing organisms (particularly higher plants) in sufficient quantities and in the proper proportions for optimum rates of the essential metabolic processes of these organisms.

*Alluvial deposit*—Sand, silt or clay deposited by streams.

*Available nutrients*—Nutrients capable of being taken up by plants at a rate significant to crop production.

*Consistence*—The degree of cohesion of soil or of soil aggregates; resistance to deformation or rupture; feel to the fingers.

*Drift*—Material picked up, mixed, disintegrated, transported, and deposited through the action of glacial ice or of water resulting primarily from the melting of glaciers.

*Glaciofluvial deposit*—Materials produced by glaciers and carried, sorted and deposited by water that originated mainly from the melting of glacial ice. These deposits are stratified and may be in the form of outwash plains, deltas, kames, eskers, or kame terraces.

*Gley*—Yellow and gray mottling in the soil, produced by partial oxidation and reduction of iron through intermittent saturation with water in the presence of organic matter.

*Gravel*—Rock fragments from 2 mm. to 3 inches in diameter.

*Horizon*—A layer in the soil profile approximately parallel to the land surface with features produced by soil-forming processes. Surface organic horizons are measured *upwards* from the surface of the uppermost mineral horizon; mineral horizons are measured *downward*. The main organic horizons described in this report are defined as follows:

L—An organic layer characterized by the accumulation of organic matter in which the original structures are definable.

F—An organic layer characterized by the accumulation of partly decomposed organic matter. The original structures are discernible with difficulty. Fungi mycelia are often present.

H—An organic layer characterized by an accumulation of decomposed organic matter in which the original structures are undefinable. If it is not possible to subdivide the organic layer, it may be referred to as L-H or other combinations.

The major mineral horizons described in this report are defined as follows:

A—A mineral horizon or horizons formed at or near the surface in the zone of maximum removal of materials in solution and suspension and/or maximum in situ accumulation of organic matter. It includes horizons in which organic matter has accumulated as a result of biological activity (Ah); horizons that have been eluviated of clay, iron, aluminum with or without organic matter (Ae), and horizons markedly disturbed by cultivation or pasture (Aa).

B—A mineral horizon or horizons characterized by an alluvial enrichment (exclusive of dolomite or salts more soluble in water) of silicate clay, iron, aluminum, or organic matter (Bt, Bf, Bh, Bfh).

C—A mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B horizons, excepting the process of gleying, and the accumulation of dolomite and salts more soluble in water (Ck, Cs, Cg and C).

D—A layer underlying the C, or the B if no C is present, that is unlike the C or material from which the solum has developed.

The mineral horizons described in this report are subdivided as follows:

a—A layer disturbed by man's activities. Used only with A.

c—A cemented (irreversible) pedogenic horizon.

e—A horizon characterizd by the removal of clay, iron, aluminum or organic matter. Usually lighter-colored than the layer below.

f—A horizon enriched with hydrated iron (Fe). It has a chroma of 3 or more and is redder than the horizon above or below.

g—A horizon characterized by the reduction of iron, and gray colors; often mottled.

h—A horizon enriched with organic matter. It must show at least one Munsell unit of value darker than the layer immediately below.

*Lacustrine deposits*—Materials that have settled out of the quiet waters of Lakes and exposed by lowering of the water or elevation of the land. They are usually varved (show layered annual deposits).

*Marine deposits*—Material deposited or settled out of sea water and exposed by lowering of the water or elevation of the land. They are usually not varved.

*Mor*—Unincorporated organic material that rests with little mixing on the underlying mineral or organic mineral horizon.

*Mottles*—A variegated pattern of spots and streaks of color, usually yellow and gray, sometimes blue. Indicating poor drainage.

*Munsell color notations*—Soil colors are determined by comparison with the Munsell color chart, which includes many colored chips arranged according to their Munsell notation. The arrangement is by hue, value and chroma. Hue is the dominant color, value refers to the relative lightness of color, and chroma is the relative strength of color and increases with decreasing grayness. In writing the Munsell notation, the order is hue, value, chroma with a space between the hue letter and the succeeding value number, and a virgule between the two numbers for value and chroma, e.g., 5YR 5/6 is yellowish red.

*Ortstein*—A *B* horizon that is irreversibly cemented with iron and humus.

pH—The intensity of soil acidity or alkalinity expressed as the logarithm of the reciprocal of the hydrogen ion concentration. With this notation, pH is neutral; the lower values indicate acidity, the higher values alkalinity.

*Soil group*—All the soils within a great soil group are of the same genetic type and are largely uniform in kind and arrangement of horizons.

*Podzol Great Group*—The undisturbed soils have organic surface horizons (L-H), a light-colored eluvial (Ae) horizon, and an illuvial B horizon (Bf or Bfh) in which organic matter and sesquioxides are the main accumulation products. The main B horizon contains less than 10 per cent organic matter, but a thin (less than 2 inches thick) Bh horizon containing more than 10 per cent of organic matter may be present immediately under the Ae. The solum is generally moderately to strongly unsaturated.

Orthic Podzols—Soils with organic horizon(s) (L-H), a light-colored eluvial (Ae) horizon more than one inch thick, and a friable Bfh or Bf horizon of high chroma. A Bh subhorizon containing more than 10 per cent of organic matter is lacking or less than 2 inches thick.

Gleyed Podzol—Podzol soil with mottling or other discolorations due to periodic wetness in the Ae and Bf horizons.

*Eluviated Gleysol Great Group*—Soils with organic horizons up to 12 inches thick, or with an Ah horizon or with both, but with a mottled Aeg horizon and a mottled Bg horizon. These soils are developed under grasses, sedges and swamp—forest.

Low Humic Eluviated Gleysols—Soils with organic horizons up to 6 inches thick, a thin (2 inches thick) or absent Ah horizon underlain by a mottled Aeg horizon and a mottled Btg horizon.

Ferrallitic Eluviated Gleysols—Soils with organic horizons up to 6 inches thick, a thin (2 inches thick) or absent Ah horizon, a mottled, strongly gleyed Aeg horizon and a mottled, strongly gleyed Bfg horizon. Developed under swamp—forest, heath or swamp vegetation.

*Regosol Great Group*—Well and imperfectly drained soils that lack discernible horizons or in which horizon development is limited to a non-chernozemic organic-mineral surface horizon (Ah) or to organic surface horizons (L-H) up to 12 inches thick.

Orthic Regosol—Soil lacking any horizon development or with a thin or weak Ah horizon and without visible evidence of salts or gleying. (Weak Ah horizons are those that will not produce Aa horizons 5 inches thick and one Munsell unit darker in value than the C horizon—dry colors).

Gleyed Regosol—An imperfectly drained Regosol.

*Soil profile*—A vertical section of the soil through all its horizons and extending into the parent material.

*Soil series*—A group of soils formed from the same parent material and having horizons similar in distinguishing characteristics and arrangement, except for the texture of the surface soil.

*Soil structure*—The arrangement of primary soil particles or aggregates, the aggregates being separated by surfaces of weakness. The aggregates differ in grade of development (degree of distinctness) as follows: structureless (no observable aggregation or no definite orderly arrangement; massive if coherent, single grain if noncoherent), weak, moderate and strong. They vary in class (size) as follows: very fine, fine, medium, coarse and very coarse. They vary also according to type (shape). The types mentioned in this report are: Granular—having more or less rounded aggregates without smooth faces and edges, relatively nonporous; single grain. Platy—having blocklike aggregates with sharp, angular corners. Subangular blocky—having blocklike aggregates with rounded and flattened faces and rounded corners.

*Solum*—The part of the soil profile above the C horizon and in which the processes of soil formation are active.

*Texture*—The percentages of sand, silt and clay in a soil determine its texture. Particles from 2 to .05 mm. in diameter are called sand, those from .05 to .002 mm. are called silt and those less than .002 mm. are called clay. *See* Figure 20.

*Topography*—The soil slope.

*Till*—That part of the glacial drift deposited directly by the ice with little or no transportation by water. It is generally an unstratified, unconsolidated, heterogenous mixture of clay, silt, sand and gravel, and sometimes boulders.

MAPS
NOT
FILMED

CARTES
OMISES